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UDC: 631.46:579.64/65.017.7

GROWTH OF SOIL BACTERIA IN PRESENCE OF MARTIAN SOIL ANALOG, CARBON DIOXIDE  
AND HYDROGEN PEROXIDE

Moscow MIKROBIOLOGIYA in Russian Vol 53, No 4, Jul-Aug 84 (manuscript  
received 23 Nov 82) pp 605-608

IMSHENETSKIY, A. A., MURZAKOV, B. G., YEVDOKIMOVA, M. D. and DOROFYEVA,  
I. K., Institute of Microbiology, USSR Academy of Sciences, Moscow

[Abstract] Data are obtained on the composition of soil bacterial communities growing in mixture of minerals modeling Martian soil in the presence of carbon dioxide gas and hydrogen peroxide. After cultivation of experimental specimens, bacteria were grown in a meat-peptone broth in a thermostat at 28°C under ordinary laboratory conditions and at 28°C in aerostats filled with carbon dioxide. The data show a general tendency toward significant decreases in the number of bacteria upon cultivation both under aerobic conditions and in the aerostats in comparison to the initial quantity, not only in the presence of the soil analog, but also in soil specimens without addition of the analog. It is found that a very high content of carbon dioxide and the presence of a mixture of minerals does not exclude completely the possibility of existence of microorganisms. It must be emphasized that spore-forming microorganisms under these conditions not only have higher sensitivity to unfavorable factors in the environment, but also that their vegetative growth occurs intensively when the conditions become favorable. Figures 2, references 13: 9 Russian, 4 Western.  
[874-6408]

RADIATION TECHNOLOGY IN HORTICULTURE AND MEDICINE

Kiev PRAVDA UKRAINY in Russian 4 Sep 84 p 2

[Article by G. Polikarpov, UkSSR Academy of Sciences corresponding member and V. Baraboy, doctor of medical sciences, under the rubric "Competition for the UkSSR State Prize": "Creative Radiation"]

[Text] X-rays and gamma rays and neutron and proton flux are the creation of 20th century science. In addition to broad application in technology and energy, they are being used with increasing success in agriculture--for the creation of new varieties of high-yield crops, for improving conditions for product storage, and for pest control. In medicine, these rays are used for the early diagnosis and treatment of many diseases. Scientists from the Ukraine, the RSFSR and Moldavia, headed by D. M. Grodzinskiy, corresponding member of the UkSSR Academy of Sciences have made a great contribution to the development of these directions in theoretical and applied radiobiology.

Thus, for the first time in plant radiobiology, gamma irradiation of fruit crop rootstocks was used to overcome incompatibility of different varieties during grafting. Based on this method, a technique was developed for preparing a rootstock grapevine for grafting. This technique, with no analogy in world practice, acknowledged as an invention, guarantees improvement in the growing together of poorly compatible varieties of grapes, and significantly increases the yield of high-grade plant grafts. It is significant that these ideas have been extensively realized in practice. A special gamma-apparatus, Sterilizer-1, has been tested and is in operation at the Viyerul Scientific Production Association in Moldavia. Twelve million grape cuttings per year can be irradiated with it. Adaptation of the progressive method in viticulture at farms in Moldavia and the Odessa region is reducing manual labor expenditures by a factor of 20-25, while simultaneously increasing productivity by a factor of almost 10. The economic effect is 30-40 rubles per 1,000 grafted grape seedlings. On a country-wide scale, this promises an annual savings of over 18 million rubles. Eight-year tests at vineyards indicated that irradiation causes no genetic changes whatsoever in plants, no deterioration in berry [sic] quality, and no decline in yield.

Radiobiology encompasses the various facets of the effect of radiation on living cells and tissues. It is known that ionizing radiation is a powerful

weapon in oncology. Studies of recent years have shown that fast neutron irradiation is particularly effective in the control of tumors. A new class of radioprotective compounds have been studied and suggested for the prevention and treatment of injuries sometimes arising in radiation therapy, significantly increasing its effectiveness.

Creative radiation has also proved to be an extraordinarily specialized instrument for the regulation of immunological reactivity of the body during organ transplants.

Consolidation of the thought and experience of various specialists has made it possible to successfully solve practical problems of medicine and agriculture in the common course of radiobiology.

"Development of a theory for modifying the reaction of radiation on the body and creation on its basis of new radiation-biological technologies" is truly innovative work.

12262

CSO: 1840/001

UDC 541.183+577.15

CHEMICAL SYNTHESIS OF INORGANIC CARRIERS FOR IMMOBILIZED ENZYMES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 278, No 2, Sep 84 (manuscript received 18 Jan 84) pp 362-364

GIMANOVA, I.M., POSTNOV, V.N. and ALESKOVSKIY, V.B., corresponding member, USSR Academy of Sciences, Leningrad State University imeni A.A. Zhdanov

[Abstract] Silochrome C-120 was chemically modified to test its suitability as an inorganic carrier for immobilized enzymes. By a series of acylations and deblocking reactions spacer molecules were introduced to ensure sufficient flexibility of the coupled enzyme for catalytic activity. Silochrome modified by gamma-aminopropyltriethylsilane fixed 8.7 mg/g carrier of trypsin, yielding a preparation retaining 47% of original proteolytic activity. Addition of a single epsilon-aminocaproic acid molecule as a spacer diminished trypsin fixation to 2.9 mg/g, while slightly increasing residual activity to 50%. Highest levels of tryptic activity (82%) were exhibited by preparations with two epsilon-aminocaproic acid spacers (8.9 mg/g trypsin binding). A further increase in the amino acid spacers to three or four molecules diminished residual activity slightly (75 and 76%, respectively). It is evident that an appropriate length of spacers is crucial to creating the steric conditions permitting maximum activity of immobilized enzymes. References 7 (Russian).  
[1547-12172]

UDC 547.963.32

DNA TRANSLOCATION ACROSS MODEL PHOSPHOLIPID MEMBRANES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 278, No 2, Sep 84 (manuscript received 11 Apr 84) pp 479-482

BUDKER, V.G., GOROKHOVA, O.Ye. and SOKOLOV, A.V., Novosibirsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences

[Abstract] Translocation of DNA molecules across phospholipid membranes was studied in a system of phosphatidylcholine liposomes exposed to

bacteriophage T7 DNA. DNA monitoring relied on the formation of DNA-ethidium bromide complexes and fluorescence measurements in relation to DNA-liposome binding and dissociation. Measurements at 25 and 45°C indicated that the mechanism of DNA translocation across phospholipid membranes involves the adsorption of DNA to liposome surface in the presence of calcium ions as the initial step. Subsequently, the membrane invaginates with the formation of a new liposome in which the membrane now surrounds the DNA. Assuming adequacy of this experimental model, it may be that an analogous endocytosis mechanism translocates DNA across biological membranes. Presumably, there is initial polyvalent binding of DNA to the phospholipid component of the membrane, with eventual formation of endocytic vesicles that carry the DNA into the cell. Figures 2; references 7: 1 Russian, 6 Western.  
[1547-12172]

UDC 574.52

#### BIOMASS GAIN IN *BALANUS BALANOIDES* IN RELATION TO FLOW RATE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 278, No 2, Sep 84 (manuscript received 14 Feb 84) pp 502-505

VILENKIN, B.Ya., PERTSOV, N.A., PLOTNIKOVA, N.A. and TSYGANKOVA, L.P.,  
Institute of Evolutionary Animal Morphology and Ecology imeni A.N.  
Severtsov, USSR Academy of Sciences, Moscow

[Abstract] A mathematical analysis was conducted on the rate of growth (biomass gain) of the sessile barnacle *Balanus balanoides* in the rostro-carinal direction. Measurements made over a period of 32 days in relation to the rate of water flow showed that a minimal flow rate was necessary for growth to occur, below which the nutrient supply would be inadequate to compensate for metabolic expenditures required to sustain vital activities. The experimental data were best described by a hyperbolic function advanced by Rashevsky [Rashevsky, N., Bull. Math. Biophys., 31(2):381, 1959], and led to the calculation of the minimum flow rate as 0.8 cm/sec. References 8: 4 Russian, 4 Western.  
[1547-12172]



EFFECTS OF TRIFLURALIN HERBICIDE ON PLASMA MEMBRANE  $H^+$ -ATPASE ACTIVITY OF SUSCEPTIBLE AND RESISTANT PLANTS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 278, No 2, Sep 84 (manuscript received 5 Mar 84) pp 511-512

NASYROVA, G.F., PALLADINA, T.A. and PETROVA, N.V., Institute of Plant Physiology, USSR Academy of Sciences, Kiev

[Abstract] To further define the mechanism(s) of action of the herbicide trifluralin ( $\alpha,\alpha,\alpha$ -trifluoro-2,6-dinitro-N,N-dipropyl-n-toluidine), determinations were made of its effects on the  $H^+$ -ATPase activity of plasma membranes derived from susceptible (corn) and resistant (peas) plants. Exposition of 5-day old shoots of different concentrations of trifluralin for 17 h resulted in depression of the enzyme activity, particularly in the case of the  $K^+$ -sensitive component. In the absence of  $K^+$  in the incubate, inhibition of ATPase was attained only with high ( $10^{-3}$  M) trifluralin concentrations. The results for corn and peas were analogous, but the degree of inhibition was more pronounced with the corn preparations. Essentially similar results were obtained on exposure of plasma membrane vesicles to the herbicide. It appears that one of the mechanisms of action of trifluralin involves alteration of membrane transport. Figures 2; references 9: 3 Russian, 6 Western.

[1547-12172]

## EFFECTS OF ANTIOXIDANT DIBUNOL ON BLOOD LIPID COMPOSITION AND PEROXIDATION IN PATIENTS WITH ISCHEMIC HEART DISEASE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 278, No 3, Sep 84 (manuscript received 20 Mar 84) pp 747-751

SAL'NIKOV, M.I., BARSEL', V.A. and ARKHIPOVA, G.V., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Clinical trials were conducted on 28 male and female IHD patients, ranging in age from 41 to 76 years, on the effectiveness of the antioxidant dibunol (2,6-ditertbutyl-4-methylphenol) in the management of symptomatology and in altering plasma lipid composition and lipid peroxidation. Dibunol was employed as a 20% solution in sunflower oil, dispensed in gelatin capsules to give a dose of 1600 mg/day (18-25 mg/kg) for 18-21 days. Clinical improvement was noted in 14 patients within 4-5 days, with a total of 24 patients (87.5%) showing clinical improvement in 9 days. Only two patients failed to improve clinically. Concomitant with symptomatologic improvement, clinical chemistries revealed a significant reduction in total plasma lipids, including a decrease in free cholesterol and UFA. Triglycerides,

however, were elevated. These changes were compatible with attenuation of lipid peroxidation, as indicated by depressed plasma levels of malonic dialdehyde. The clinical improvements were attributed to inhibition of lipid peroxidation in the ischemic myocardium, and consequent functional improvement in membrane transport processes. Dibunol, therefore, appears to be a promising agent for the management of atherosclerosis and its various sequelae. Figures 1; references 15: 11 Russian, 4 Western.  
[1562-12172]

## ENVIRONMENT

### EFFORTS TO EXPAND FORESTS MEET WITH NON-COOPERATION

[Editorial Report] Alma-Ata SOTSIALISTIK QAZAQSTAN in Kazakh 1 Jul 84 carries on page 4 a 1,000-word article by T. Nazarbekov, chief of the Chimkent Oblast Forestry Administration, on efforts by his organization to protect existing forests, expand them and create new. The article is published under the regular rubric "Man and Nature."

Chimkent Oblast, Nazarbekov begins, is rich in resources of every sort, particularly in forests, of which there are 1,379,000 hectares (with some 3,000,000 hectares total under the oblast forestry administration) in the oblast, most (89 percent) in the dry Kyzylkum and Moyynkum regions, where they not only constitute a valuable resource but also provide vitally needed green cover in an arid area.

Because of the importance of oblast forests, he continues, every effort is being made to protect and expand them and substantial new and re-plantings have been carried out during the current five-year-plan, including new and re-plantings aimed at pasture enhancement. Nazarbekov, however, complains of an indifferent attitude on the part of some sovkhoz and kolkhoz managers towards the allotment of the lands needed for forest and/or pasture expansion and of violations of forest protection rules by the enterprises. He also complains about violations of regulations by individuals as well, particularly persons using vehicles, something that makes them hard to apprehend.

CSO: 1840/102

UDC 543.76.005

# EVALUATION OF ANTHROPOGENIC EFFECTS ON WATER RESERVOIRS

Kiev VISNYK AKADEMIYI NAUK UKRAYINS'KOYI RSR in Ukrainian No 9, Sep 84  
pp 79-82

KLYMENKO-MESHKOVA, N. A., doctor of chemical sciences and BURAVL'OV, E. P.,  
candidate of technical sciences

[Abstract] Protection of environment from industrial byproducts is a very important problem. To solve it, it is necessary to carry out complex analysis of the effects of physical and chemical factors on water resources. A theoretical discussion was presented for basing such an evaluation on local changes in the entropy of the biosphere, since it would be impossible to evaluate individual components polluting the system. A formula was developed for possible negative effects of various impurities determining the degree of ecological danger upon their introduction into the water reservoirs via effluents, rain water, etc. A practical example was reported based on pollution from light industry. The effluents from textile plants are five times as dangerous for the biosphere as are the effluents from hosiery plants and twice as bad as those from the cotton plant effluents. References 6 (Russian).  
[038-7813]

UDC 614.73:546.711.02.54]-074

# DETERMINATION OF $^{54}\text{Mn}$ CONCENTRATION IN VEGETABLE AND SOIL SAMPLES

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received  
7 Mar 84) pp 88-90

VINTSUKEVICH, N. V., TOMILIN, Yu. A. and PIDORENKO, L. D., Nikolayev  
Regional Sanitation Epidemiology Station

[Abstract] Radioactive decay of  $^{54}\text{Mn}$  is accompanied by emission of photons with an energy of 0,835 MeV which is in the same region as the  $\gamma$ -lines of  $^{134}\text{Cs}$ ,  $^{58}\text{Co}$ ,  $^{110}\text{Ag}$  and others. One of the methods of analyzing  $^{54}\text{Mn}$  in vegetables and in soil requires extraction of its diethyldithiocarbamate with

$\text{CCl}_4$ . To improve analysis of  $^{54}\text{Mn}$  in presence of  $^{106}\text{Rn}$  and  $^{134}\text{Cs}$ , it was precipitated with potassium chloride from refluxing nitric acid solution. This method was shown to be applicable to determination of  $^{54}\text{Mn}$  in presence of other radionuclides with overlapping  $\gamma$ -spectra. Figures 3; references 4 (Russian).  
[1552-7813]

UDC 614.777:628.191:[615.285.7+631.8]:628.33([47+57]-22)

#### HYGIENIC STUDY OF BARRIER FUNCTION OF LOCAL WATER PURIFICATION FACILITIES IN RESPECT TO CHEMICAL POLLUTANTS 'AGROCHEMICALS AND SURFACTANTS'

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received 14 Mar 84) pp 15-18

IL'IN, I. Ye., Saratov Medical Institute

[Abstract] Contamination of water reservoirs is presently a multicomponent phenomenon because pesticides, fertilizers, petroleum products, dyes and surfactants may all be present in water. Efficiency of commonly-employed water purification methods was evaluated: sedimentation, chlorination, filtering, and its related effect on representative groups of agricultural chemicals. The most vulnerable link in the rural water purification system was the filtration; in presence of surfactants, the filtration effectiveness was reduced by 40-50%. The effectiveness of this "hauling" function of surfactants was related to chemical structure of the polluting compounds and to homologous characteristics of the detergents. The effectiveness of the precipitation of chemical impurities from polluted water depended on their solubility in water. Figure 1.  
[1552-7813]

UDC 613.15:577.19]:[613.167.4:551.594.12

#### EFFECT OF PHYTONCIDES ON AIR IONIZATION

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received 5 Mar 84) pp 82-83

DMITRIYEV, M. T., ZAKHARCHENKO, M. P., STEPANOV, E. V. and VISNAPUU, L. Yu., Scientific Research Institute of General and Communal Hygiene imeni A. N. Sysin, USSR Academy of Medical Sciences, Moscow

[Abstract] The effect of phytoncides ( $0.1 \text{ mg/m}^3$ ) on air ionization was studied in an experimental chamber with  $16 \text{ m}^3$  volume. It was shown that concentration of light ions increased by 20-21% in presence of phytoncides of Siberian spruce and fir; the average ions decreased significantly (20-24%) and the heavy ions either dropped or increased. A number of normal

living processes lowered significantly air ionization: gas combustion used in preparation of food, exhaled air and, especially, tobacco smoke. One cigarette lowered the concentration of light ions by 27%, two -- by 48%, three -- by 68%. Six cigarettes smoked concurrently removed completely the light ions from the air. References 12: 9 Russian, 3 Western.  
[1552-7813]

UDC 614.73:613.161/.163

#### EFFECT OF SOME METEOROLOGICAL FACTORS ON CONTENT CHANGES OF RADON DECAY PRODUCTS

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received 8 Feb 84) pp 75-77

KWAPULINSKI, E. and NOWAK, B., Institute of Environment Formation, Katowice Branch, Polish Peoples Republic

[Abstract] One of the more important aspects of the protection of environment concerns the radioisotopes and the radiation emanating from them in the atmosphere. As a result of human activities, some natural radioisotopes like  $^{222}\text{Rn}$  accumulate, and upon decay, lead to formation of short lived  $^{218}\text{Po}$ ,  $^{214}\text{Pb}$  and  $^{214}\text{Bi}$  solid dust particles in a state of suspension. The most important factors affecting the content of these products in atmosphere are wind, pressure and temperature. With increased atmospheric pressure, the air concentration of  $\text{Po}$ ,  $\text{Pb}$  and  $\text{Bi}$  is lowered. At  $20^\circ\text{C}$ , radon is released from soil and falls out at an increased rate. The content of radon decay products in snow is lowered with prolonged snow fall. A directly-proportional relationship exists between increased content of radon decay products and faster wind velocity in the range of 0.5-4.5 m/sec. Figures 7; references 2 (Western).  
[1552-7813]

UDC 615.471.03:[614.715/.72: 656.13]-07

#### ELECTRICAL ASPIRATION DEVICE FOR SAMPLING AEROSOLS BEHIND AUTOMOBILES

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received 14 Feb 84) pp 70-71

MASLOVSKIY, R. Ya. and KRYUKOV, S. Yu.

[Abstract] Air currents originating in the movement of vehicles contribute to pollution of the atmosphere. To be able to evaluate concentration of the aerosols forming behind moving traffic vehicles, a special aspirator was developed capable of air sampling under isokinetic conditions. The unit showed some operational deficiencies. In this paper, a modified version

is described in which a gas-driven motor was replaced with an electrical one, the regulator controlling the baffle plate was changed to a rheostat and a new improved fan was mounted. These changes increased the capacity of the unit to 600 m<sup>3</sup>/hr and permitted to operate this unit at speeds up to 40 km/hr; it lowered the noise level and solved the problem of gas exhaust. Figures 2.

[1552-7813]

#### ENVIRONMENTAL PROTECTION IN ARMENIA

Yerevan KOMMUNIST in Russian 12 Oct 84 p 2

ARMENPRESS [Armenian Press Service ?]

[Abstract] At a recent meeting of the Commission for Environmental Protection and Rational Utilization of Natural Resources of the Presidium of the Council of Ministers of the Armenian SSR the key topic of discussion was prevention of industrial pollution of the rivers Razdan, Debet and Pambak. Note was made of the fact that despite increased construction of facilities for biological water purification, some industrial and governmental bodies still are lax in implementing Party directives in this regard. In addition, the construction of some projects has been unduly delayed, particularly in the Aniyskiy Rayon. Other topics dealt with protection of various ungulates by limiting or abolishing hunting, and with other measures taken to assure propagation of the species particularly at risk from human intervention in their environment.

[035-12172]

#### EXPLOITATION OF MARINE RICHES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Aug 84 p 4

SVINTITSKIY, Yu.

[Abstract] In an interview with G.G. Matishov of the Murmansk Marine Biological Institute Matishov characterizes the sea at Murmansk as a "pot of gold," but notes that we must learn how to open the pot properly. Rather than hunting in the sea, we must learn to farm it. The Institute is studying raising algae as an important protein source. The Institute is studying such phenomena as the ability of fish to detect ultralow frequency electromagnetic waves and detect thus the approach of hurricanes and other phenomena.

[829-6508]

UDC: 578.832.1:578.74].083.3

ANTIGEN ANACHRONISM OF A(H2N2) INFLUENZA VIRUSES IN LENINGRAD IN 1980.  
REPORT 1. EPIDEMIOLOGIC AND SEROLOGIC CHARACTERISTICS OF INFLUENZA  
INFECTION CAUSED BY A/LENINGRAD/80 (H2N2) VIRUSES

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 8, Aug 84 (manuscript received 25 Oct 83) pp 105-110

KARPUKHIN, G. I., POPOVA, T. L., KARPOVA, L. S., TSYBALOVA, L. M., DENISOV, G. M., OLEYNIKOVA, Ye. V., RUMEL', N.B., SYRODOYEVA, L. G., NAYKHIN, A. N., GALITAROV, S. S. and GOLUBEV, D. B., All-Union Scientific Research Institute of Influenza, USSR Ministry of Health, Leningrad

[Abstract] A report is presented on cases of influenza caused by viruses with antigen structure A(H2N2) recorded in Leningrad in the spring of 1980 primarily among children and young people. 68 children, from 3 months to 3 years of age, from a children's home and 200 young people 16 to 18 years of age from a specialized secondary school were observed by the authors' institute between September of 1979 and July of 1980. Blood samples were taken from all the children at intervals of 2 to 3 months. If upper respiratory infections developed, nasopharyngeal samples were taken for virologic and immunofluorescent studies from the patients and persons in contact with them. 10 to 15 children were also studied twice per week for the presence of influenza virus. A clinical-epidemiologic examination of 58 upper respiratory disease foci was also performed in May-June of 1980 with blood and nasopharyngeal specimens taken from all sick persons. Case histories from the study are described. It was determined that two unrelated outbreaks of influenza-like disease occurred in April-May of 1980 in Leningrad. 50 of the 68 children in children's home fell ill, 13 of 50 of the young persons. 5 strains of influenza A virus were isolated from three patients and one clinically healthy subject. A reliable and isolated seroconversion to HA H2 was documented from February through May of 1980 in 6 of the children under observation. Among those hospitalized between May and November of 1980 at the authors' institute, a diagnostically-significant and isolated seroconversion to HA H2 was recorded in 3.5% of children and 4.5% of adults. A study of the antihemagglutinin content in the population showed that in people 18 to 50 years of age in 1980 the level was high. Only children less than 12 years of age were free of anti-HA H2. Figures 2; references 9: 7 Russian, 2 Western.  
[1603-6508]



## ESTIMATE OF TYPHUS INFECTION POTENTIAL BASED ON SEROLOGIC INDICES OF IMMUNOLOGIC STRUCTURE OF THE POPULATION

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 7, Jul 84 (manuscript received 4 Oct 83) pp 110-111

BOGDANOV, V. V., Saratov Medical Institute

[Abstract] An estimate was made of the potential for typhus infection in Saratov based on materials from a serologic study of persons with fevers arriving at the diagnostic section of the city hospital. The frequency of location of persons with rickettsia antibodies gradually decreased over a period of 15 years by a factor of 2.5. In the 1970's and 80's, positive reactions were encountered almost entirely among older persons. It is concluded that between 1966 and 1981 the pathogen did not circulate among the population of Saratov.

[1593-6508]

UDC: 616.9-084:4(47+57)

## RESULTS OF FULFILLMENT OF RECOMMENDATIONS OF 16TH ALL-UNION CONGRESS OF MICROBIOLOGISTS AND EPIDEMIOLOGISTS AND PRESENT TASKS IN AREA OF CONTROL OF INFECTIOUS DISEASE IN USSR

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 7, Jul 84 (manuscript received 15 Nov 83) pp 4-16

BURGASOV, P. N., USSR Ministry of Health, Moscow

[Abstract] During the 6 years which have passed since the 16th congress of microbiologists and epidemiologists, research has been performed on the propagation of infections caused by opportunistic microorganisms, the role of specific and nonspecific immunity factors in the formation of resistance to infectious and parasitic diseases, the pathogenic significance of such recently discovered bacteria and viruses as the pathogen of legionnaires' disease, representatives of the rotavirus group, "not A, not B" hepatitis and others. Third generation diagnostic preparations for radioimmune and immune-enzyme analysis are currently being tested to identify pathogens of these and other diseases. Protection of the territory of the USSR from import and propagation of quarantinable and other infectious diseases is required by the epidemiologic situation in the world. In 1981 alone some 5 million foreign citizens from 152 nations visited the USSR. Over the past 6 years 25% of cases of epidemic complications of typhus abdominalis, paratyphus and dysentery were related to the water factor, emphasizing the importance of work to provide the population with purer water. In 1982, as before, a high percentage of children who were not inoculated against polio was recorded in Latvia, Estonia, Moldavia, Belorussia and the RSFSR.

The percentage of children not inoculated against diphtheria is also high in these areas. Morbidity of polio and malaria is increasing in Turkmenia, the Tajik and Azerbaijan SSR's.  
[1593-6508]

UDC: 616.36-002.14-022:578.891]-084.4

#### SCIENTIFIC AND PRACTICAL PROBLEMS OF VIRAL HEPATITIS CONTROL

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 7, Jul 84 (manuscript received 16 Nov 83) pp 16-21

SUMAROKOV, A. A., BALAYAN, M. S., GORBUNOV, M. A. and NARKEVICH, M. I., State Scientific Research Institute of Standardization and Testing of Medical Biological Preparations imeni L. A. Tarasevich; Institute of Poliomyelitis and Viral Encephalites, USSR Academy of Medical Sciences, Moscow; USSR Ministry of Health

[Abstract] Pressing scientific problems in control of viral hepatitis are listed. For hepatitis A, they include: study of the causes of nonuniformity of prevalence of hepatitis A in different regions in the nation, organization and conduct of studies of the epidemiologic significance of antigen carriers, monitoring of disinfection conditions and development of a system of measures intended to neutralize sources of the infection, eliminate propagation of the pathogen and reduce susceptibility to it. For hepatitis B, steps which should be taken include exhaustive location of HB<sub>s</sub> antigen carriers, particularly among medical personnel, improvement of sterilization operations, reduction in unnecessary parenteral manipulations in hospitals, complete conversion to disposable syringes and transfusion equipment and continued development of hepatitis B vaccine.

[1593-6508]

UDC: 616.936-084

#### PRESSING PROBLEMS IN ORGANIZATION OF MALARIA PROPHYLAXIS

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 7, Jul 84 (manuscript received 14 Dec 83) pp 45-50

SOPRUNOV, F. F., Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martsinovskiy, Moscow

[Abstract] The morbidity of malaria in the USSR, particularly Azerbaijan, has become worse since the mid-70's. This can be traced to successes achieved in the 50's and 60's and resulting reduction of commitment and budget to malaria control in the 1960's. Several directions of research are noted as being promising for further improvement of the malaria situation: development

of a standardization map of malaria foci in the USSR: the search for new antimalarial preparations among various classes of chemical compounds; study of the biochemistry and molecular biology of the pathogen, its interrelationship at a molecular level with the host and vector; combined research into the structure of the area of occurrence of malaria in the world and distribution of the imported cases of malaria.  
[1593-6508]

UDC: 616.831-002-022:578.833.26]-036.2-078

# STRUCTURE OF TICK-BORNE ENCEPHALITIS VIRUS POPULATION IN FOCI WITH VARIOUS LEVELS OF MORBIDITY

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 19 May 83) pp 323-326

PUSTOVALOVA, V. Ya. and KATIN, A. A., Tyumen' Scientific Research Institute of Regional Infectious Pathology

[Abstract] Results are presented from isolation of 110 strains of tick-borne encephalitis virus from ticks collected in the Isetsk focus, Tyumen' Oblast and the Talitsk focus, Sverdlovsk Oblast, differing significantly in morbidity of the population (in Isetsk - 8.4/100,000; in Talitsk - 86.3/100,000 population). Results are presented from a study of virulence of 92 strains of virus for white mice and determination of the specific weight of strains with various virulence levels in the total mass from each focus. The antigen characteristics of the strains from the eastern Transurals and the western part of Western Siberia are presented. The results obtained do not agree with studies which have indicated a direct relationship between population morbidity and biological properties of the circulating viral strains. However, they do agree with many published results indicating that there is no relationship of this sort, due to the similarity of biological properties of tick-borne encephalitis virus strains isolated in different parts of the area of infection. The results produced show that the level of morbidity of the population in a number of territories in the area of infection is determined not by the virulence of the virus strains, but rather by components in the valence of the focus of an epidemiologic nature such as the number of vectors, frequency of their contact with the population, etc. The antigen structure of tick-borne encephalitis virus strains found in Tyumen' and Sverdlovsk oblasts is original, indicating a variety of antigen variants of the virus, apparently not limited to those already known. References 16 (Russian).  
[1599-6508]

DETECTION OF COXSACKIE B VIRUS IN SEWAGE AND CORRELATION WITH SERIOUS  
MENINGITIS MORBIDITY

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript  
received 18 Oct 83) pp 331-334

SPYNU, K. I. and VUTKAREV, V. P., Moldavian Scientific Research Institute  
of Hygiene and Epidemiology, Kishinev

[Abstract] Results are presented from a parallel virologic study of sewage  
from neighborhood collectors, aeration plants and materials from serous  
meningitis patients in Kishinev in 1979-1982. The variation between frequen-  
cy of detection of enteroviruses, particularly Coxsackie B1, and the number  
of cases of serous meningitis etiologically-related to the virus is studied.  
Highest morbidity was observed among children 3 to 6 years of age in July  
and August. Enteroviruses were found in sewage samples through the period  
of observation, particularly in summer and fall. These same types were  
found in all sewage samples. The correlation coefficient between finding  
enteroviruses in sewage samples and the incidence of serous meningitis was  
0.36-0.44. The studies show that Coxsackie B1 virus was detected in sewage  
even after no additional cases of serous meningitis were found as the  
epidemiologic situation improved in 1980-1982. This is apparently a  
result of the widespread carrying of the virus. The results indicate a  
correlation between detection of enteroviruses in sewage and its excretion  
by persons with serous meningitis in terms of type composition and seasonal  
distribution, as well as the relationship between frequency of detection and  
number of cases of serous meningitis. Figures 4; references: 8 Russian.  
[1599-6508]

UDC: 616.61-002.151-022:578.8]-078.3

SEROLOGIC CONFIRMATION OF CASES OF HEMORRHAGIC FEVER WITH RENAL SYNDROME IN  
BELORUSSIA

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript  
received 25 Oct 83) pp 355-357

GAVRILOVSKAYA, I. N., APEKINA, N. S., CHUMAKOV, M. P., VOTYAKOV, V. I.,  
RYTIK, P. G., VOINOV, I. N., LOMONOSOV, N. N. and GUTKOVSKIY, I. A., Institute  
of Poliomyelitis and Viral Encephalites USSR Academy of Medical Sciences,  
Moscow; Belorussian Scientific Research Institute of Epidemiology and  
Microbiology, Minsk

[Abstract] Blood serum specimens from hemorrhagic fever survivors from  
Brest and Gomel'sk oblats in Belorussia were studied. Six lung sections from  
mammals caught in foci of the disease along the Volga, near the Urals and  
in Belorussia were used as the antigens in studies by the indirect  
fluorescent antibody method, as well as specimens from animals experimentally

infected with the virus. Antibodies were found in 4 persons, who had had the disease in 1980-1982, of six studied. Titers varied from 1:10 to 1:1280. The antigen was found in 11 of 102 rodents (*Clethrionomys glareolus*) trapped around the village where the disease occurred. Comparative titration of the sera from former patients in Belorussia with viral antigens circulating in Udmurtia and Belorussia yielded identical results. References 6:  
3 Russian, 3 Western.  
[1599-6508]

UDC: 616.36-002-022.085.371

COMPARATIVE ESTIMATE OF EFFECTIVENESS OF TWO METHODS OF IMMUNOGLOBULIN  
PROPHYLAXIS OF HEPATITIS A IN TERRITORIES WITH HIGH LEVELS OF MORBIDITY OF  
THIS INFECTION

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 8, Aug 84 (manuscript received 30 Dec 83) pp 101-104

GORBUNOV, M. A., SUMAROKOV, A. A., YAROSHEVSKAYA, N. Yu., IKOYEV, V. N.,  
KUDRYAKOVA, R. A., AKHMETOVA, R. Kh., SAVCHENKO, V. I. and SHAPIYEV, Zh. Sh.,  
State Scientific Research Institute of Standardization and Testing Medical  
Biological Preparations imeni L. A. Tarasevich, USSR Ministry of Health,  
Moscow

[Abstract] A comparative estimate is presented of the prophylactic effectiveness of two methods using immunoglobulin in territories with high hepatitis A morbidity: single administration of the preparation to groups most greatly affected (organized preschool children) during formation of these teams, which coincides with the seasonal rise in morbidity, and administration of the preparation to persons in contact with patients in epidemic foci (children's institutions) as cases of the disease arise. Studies were performed in 1981-1982 in two cities of the Kirgiz SSR. It was found that simultaneous, one-time administration of immunoglobulin at the beginning of the seasonal rise decreased morbidity between September and February by a factor of 4 in comparison to a control group. In the area tested administration of immunoglobulin to children in contact with the disease upon first determination of a case is a less effective prophylactic method than simultaneous one-time administration to all children. References 3 (Russian).  
[1603-6508]

PROBLEMS OF INFECTIOUS DISEASE CONTROL AT 7th CONGRESS OF RUSSIAN NATURAL SCIENTISTS AND PHYSICIANS (IN HONOR OF 100th ANNIVERSARY OF THEORY OF PHAGOCYTOSIS)

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 8, Aug 84 (manuscript received 10 Jul 83) pp 115-118

VLADIMIROVA, L. B., Odessa Medical Institute imeni N. I. Pirogov

[Abstract] The 100th Anniversary of the 7th Congress of Russian Natural Scientists and Physicians at which I. I. Mechnikov first founded the science of phagocytosis is celebrated by this report of a conference held in 1883. Some of the reports read at the original conference are described: in the report of Dr. Finkelstein, "on the situation of medicine in the armed forces and hospitals," a suggestion was made concerning reorganization of medical-sanitary affairs in the army, demonstrating the need for institution of planned and daily work with epidemic disease. The report of Dr. Henrichsen showed the need for introducing mortality statistics to the Russian army and the possibility, using operations with quantitative indices, of predicting epidemic outbreaks of smallpox, diphtheria, cholera and taking steps to limit these epidemics. References 22 (Russian). [1603-6508]

UDC: 616.36-002-022-084:313.13

EFFECTIVENESS OF PREVENTIVE MEASURES TO DECREASE HEPATITIS B MORBIDITY IN THERAPEUTIC-POLYCLINIC INSTITUTIONS OF MINSK OBLAST

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 8, Aug 84 (manuscript received 11 Jul 83) pp 118-120

LEVKOV, P. V., LAGUN, S. P., BOGUSH, O. M., BOGOMOL'SKIY, M. Ye., AVERCHENKO, K. P., Minsk Oblast Sanitary-Epidemiologic Station

[Abstract] Methods of mathematical statistics were used to analyze the dynamics of hepatitis B morbidity in 1978-1982 in Minsk Oblast in relationship to preventive measures performed in attempts to decrease it. The morbidity of hepatitis B has tended to decrease since 1978 in Minsk Oblast. Some 70% of the patients were infected by various types of injections. Work including provision of dry sterilization apparatus has resulted in a decrease in overall hepatitis B morbidity, decreasing by a factor of 3.5 the number of medical organizations with 3 or more cases. References 7 (Russian). [1603-6508]

## FOOD TECHNOLOGY

### EFFORTS TO SAVE LABOR IN FOOD SALES, SERVICES

[Editorial Report] Alma-Ata SOTSIALISTIK QAZAQSTAN in Kazakh 22 July 84 carries on page 2 a 1,000-word article by KaSSR Minister of Trade N. Tantsyura published in honor of Soviet Trade Workers Day. Tantsyura's article, which concentrates on republic food sales and services, stresses new, large and centralized food outlets and mass-service, automated cafeteria as the current area of development emphasis, both to provide improved and more efficient service and to economize with short labor resources. Tantsyura notes the great progress that has been made towards achieving these latter goals but also complains of failure to meet trade turnover plans as a whole, failure to take advantage of the existing resource base fully, problems with the new technology and a shortage of cafeteria places.

CSO: 1840/102

HYGIENIC EVALUATION OF PAPER USED IN TEA BAGS

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received 19 Jan 84) pp 80-81

CHUDINSKAYA, T. A., SHUBENKIN, N. G., KOTOMINA, M. Ye., BASOVA, N. K. and ZHUKOVA, V. V., All Union Scientific Research Institute of Synthetic Fibers, Kalinin

[Abstract] In order to assess the potential of introducing into wide use non-dissolvable, thermally stable paper for single-use tea bags, sanitation-toxicological properties of the experimental domestic paper, based on vinyl chloride and vinyl acetate, were studied. Aqueous extracts of the paper had no taste or odor and did not affect the quality of tea. Mass spectroscopic analysis of the domestic sample showed no significant difference from the imported control sample. No adverse toxic effects were found in the test animals and no pathomorphological changes were observed in their organs after sacrifice. The domestic paper was approved for the preparation of single-use tea bags. References 10: 9 Russian, 1 Western. [1552-7813]

VALUABLE BYPRODUCTS FROM AGRICULTURAL WASTES

Moscow SEL'SKAYA ZHIZN' in Russian 29 Sep 84 p 2

POTERYANKO, I., director, Northern Caucasus Branch, All-Union Scientific Research Institute "SINTEZBELOK", FILATOV, A., laboratory chief, TEREMENKO, Yu., department chief, GLAZMAN, B., engineer, and KHOMENKO, N., senior scientist

[Abstract] Single-cell protein production by microorganism cultures relies heavily on the use of agricultural waste products, such as corn stalks, husks, and so forth, which are thereby transformed into a valuable raw resource. Unfortunately, in all too many cases such products are not delivered to the microbiological enterprises and are simply wasted. As a result, underutilization of such a resource deprives the country of vast amounts of single-cell



protein, xylitol, vitamins, amino acids, and other products that are produced by microbiological synthesis. Much remains to be done to alert the various ministries and departments to the need for a more rational utilization of agricultural byproducts. Careful accounting practices should be implemented to minimize wastage of such resources and ensure their full utilization by the microbiological industry.  
[033-12172]

## GENETICS

### AGRICULTURAL APPLICATIONS OF GENETIC ENGINEERING

Moscow IZVESTIYA in Russian 15 Sep 84 p 3

[Article by Academician A. Bayev, Hero of Socialist Labor, USSR State Prize Laureate, Chairman of the USSR Academy of Sciences Council on Biotechnology: "Are There Sources of Immortality?"]

[Text] At first glance, our ability to transform matter seems unlimited. But the very nature of things does place limits to that kind of activity. On the other hand, our ability to influence natural processes in many cases is much broader than would seem to be the case by virtue of the current level of our knowledge about nature. In particular, it would seem that the living world is beyond the unlimited influence of humans because of its complexity. But that is not so. Domestic species of animals and cultivated plants that were developed even in antiquity did not exist in nature, but were the creation of humans.

This is obvious. But it would also seem obvious that despite the many centuries of experience we have gained in transforming the living world, humankind is still not able to create life on the basis of newly man-made laws or are we yet able to imitate nature. And yet, in our time, man has already taken the first steps toward that goal. The first step was made when it became possible to manipulate biological macromolecules, the cells of animals and plants.

As long as 50 years ago isolated plant cells and tissues were cultivated in test tubes, and this led to the emergence of a fundamentally new field of biology--genetic engineering. But it did not become clear at once that essentially any tissue of any plant could start a cellular progeny. It turned out that such cells are "immortal." They can be cultivated for as long as one wishes and a part of the cultivated cellular mass can be periodically transferred to a fresh nutrient medium. An unlimited life span is the first important property of the cultivated plant cells.

A second property of such cells is that under specific conditions, particularly when there is a change in the correlation of plant hormones in the nutrient medium, the cells form embryonic stems, roots, and shoots that results in the formation of a regenerant-plant.

This property of isolated plant cells constitutes their fundamental difference from cultivated animals cells in which whole organisms cannot be produced in a culture.

Finally, there is yet another property of isolated plant cells, and that is that plant cell cultures can be handled in the same way as microorganism cultures. One can select cells with useful properties, then produce a homogeneous progeny from such cells, and then produce whole plants.

The cultivation of plant cells was initiated in the Soviet Union at the end of the 1950's when a research group for the cultivation of isolated tissues and organs was organized at the USSR Academy of Sciences Institute of Plant Physiology imeni K. A. Timiryazev. The group was headed by R. Butenko who is currently a corresponding member of the USSR Academy of Sciences. The group developed special media in which isolated cells or their groups at first lose the properties characteristic of the initial tissue, and then begin to live and propagate as independent unicellular organisms. In 1959, simultaneously with the American Steward, R. Butenko proved that test tube-cultivated cells could be transformed into a complete plant organism by altering the composition of the culture medium. Conditions were worked out for producing tobacco, potatoes, hay, carrots, and lemons from individual cells.

The potential of genetic engineering was multiplied when researchers learned how to remove the cells' outer hard membrane and produce the so-called protoplasts of plant cells. Deprived of these membranes, the protoplasts fused with each other and the resultant hybrid cells produce cellular lines which subsequently transform into a whole plant.

Consequently, the world's second non-sexual (parasexual) hybrid tobacco plant was produced. As yet the plant does not have any economic significance. But the production of this kind of plant by hybridizing cells has graphically proven the existence of new ways of making plant organisms. At the present time approximately 80 parasexual hybrids that have been created in various countries have been described.

In anticipating future developments, Academician of the UkrSSR Academy of Sciences K. Sytnik, as early as 1975, organized a laboratory for cytophysiology and plant cell design at the UkrSSR Academy of Sciences Botany Institute. Later the laboratory was transformed into the Department of Cytophysiology and Plant Cell Engineering which is under the supervision of doctor of biological sciences Yu. Gleb. Advanced and original research on non-sexual plant cell hybridization is being conducted in this department. Much could be said about these investigations, but we shall limit ourselves to the essentials.

The most interesting fundamental data have been obtained from work with genes localized in the cell cytoplasm (and not in the nucleus). These genes control such important properties as resistance to pesticides, herbicides, and photosynthesis efficiency. Under normal conditions the progeny inherit such genes only from the mother. In somatic hybridization, the progeny receives

those genes from both the mother and father. Consequently, unique organisms are created that are not found in nature.

Somatic hybridization has been particularly successful with potatoes, tomatoes, and tobacco. The hybridization of tomatoes has been so successful, for example, that economically valuable hybrids have been produced, and a hybridization method has been worked out that is suitable for commercial production. The cultivated and wild potato hybrid which was produced at the USSR Academy of Sciences Institute of Plant Physiology is resistant to viral diseases. It was not in vain that the designers of this species figured that the wild species partner would transmit natural resistance to the hybrid. That expectation was justified.

Natural and synthetically induced genetic mutations of an isolated cell culture offer the possibility of producing completely unusual hybrid cells by multiplying genetic diversity beyond the limits available to nature. All of this material can be preserved thanks to yet another innovation, i.e., cell storage in liquid nitrogen.

The time for the widespread practical use of plant cell engineering has not yet arrived. For now, scientists are creating a scientific foundation and are conducting experiments with plants that can be conveniently tested regardless of their agricultural value. But one can already foresee to which national economic sector plant cell engineering will bring the most benefit.

In many cases it is profitable to utilize a mass of cultivated plant cells of *Rauwolfia*, *Dioscorea*, opium poppy, ginseng, and other plants for producing physiologically-active substances that are extracted from natural sources. Already it is possible to reproduce plants from cells in the laboratory and produce aviral planting material. Cellular cultures comprise a natural way not only for the storage, but also for the enrichment of genetic diversity in nature, and, of course, open up possibilities for selection.

The foundation for this new research area has been laid down in our country by the works of scientists at the USSR Academy of Sciences Institute of Plant Physiology imeni K. A. Timiryazev and the UkrSSR Academy of Sciences Botanical Institute imeni N. G. Kholodnyy. These collectives have completed a series of original, innovative investigations which have enabled cellular engineering in the USSR with its own separate directions to outstrip the level of that science in the rest of the world. At the present time, the works of scientists at two of our biology centers have been recommended for the USSR State Prize for 1984. I will be happy if their research is deservedly crowned by a high award.

It is obvious that plant cell engineering is not only an instrument to enable man to discover the genetic and physiological properties of plant cells. It is also getting ready to become an effective tool of agricultural production. Its genuine triumphs in the future are probably not that far away. And it is not impossible that cellular engineering will comprise one of the foundations of agricultural technology not only of the 21st century, but even in the 20th century.

## HUMAN FACTORS

### ROLE OF ENGINEERING PSYCHOLOGY

Moscow TRUD in Russian 18 Sep 84 p 3

[Article by A. Savayan, TRUD correspondent in Yerevan: "Man at the Control Panel"]

[Text] Air traffic controller and cosmonaut, ocean liner helmsman and electric train engineer, rolling mill operator and nuclear power plant operator have all encountered one of the chief paradoxes of the scientific and technical revolution: machines and robots, having freed man from heavy physical labor have placed psychological burdens on him that sometimes exceed the capabilities of a specific individual.

The aforementioned occupations are united by one word--operator, and as it turns out, not everyone can be one. In the modern era of social development, occupational selection is a necessity. Then the safety problem at complex production units, with man as one of the links, will be solved to a great extent. The young science of engineering psychology is showing the way. Its recommendations, however, are too seldom considered. In this case, society sustains a moral as well as a material loss: sometimes an operator who has not handled a critical situation loses confidence in himself forever....

Why not be armed with recommendations of the most modern science, engineering psychology? What are the prospects for those who want to be operators in spite of it all?

These and other questions are answered by participants at a recently held conference of engineering psychologists in Tsakhkadzor [Armenia].

Yu. Zabrodin, deputy director of the USSR Academy of Sciences Psychology Institute, doctor of psychological sciences and professor: The term "human factor," whose origin in engineering psychology is the result of characteristics of an operator's work, has taken on a whole complex of qualities

that a man must have when he is at a control panel. A man's needs and capabilities, motives for his behavior, his interests and creative capacities, his fitness and ability for labor, intellect and emotions, will and character, consciousness and self-awareness, formation of social circumstances and value orientations--this is far from a complete list of attributes included in this term by psychologists. Only 8 to 10 percent of workers in industry fit the requirements of their occupations in terms of their psychological characteristics. The "human factor" was responsible for 65 percent of production injuries and mining accidents and 80-90 percent of disruption in the routine of thermal power plants (world statistics). According to WHO data, automobile accidents in which a quarter of a million people die and 7 million people are injured every year are the fault of the victims themselves in the absolute majority of cases.

One more established fact fills out these unhappy statistics--up to 50 percent of aviation accidents occur because the airplane construction is not suited to human psychological abilities, because of unsatisfactory flying abilities, disorders in the functional state of the body, and low psychological preparedness for flight. These can all be combined into the term "unforeseen situations." Artistic understanding of such a phenomenon allowed Arthur Haley to create his famous novel "Airport," which tells of a winter day when all services at Abraham Lincoln Airport operated on the brink of catastrophe. A complex system such as air traffic control or, let us say a plant, a GRES [State Regional Electric Power Plant], AES [nuclear electric power plant] is made up of a large number of people and machines. They are constantly processing incoming information. Unforeseen situations are a common occurrence here. Only the operator can solve them, based on his experience, intuition, skills acquired prior to automation and developed earlier, during training. Here is an example from domestic experience.

At one of the chemical enterprises in Yerevan, the brigade leader of the instrument control personnel asked the chief of the personnel department to have a novice operator, recently graduated from the PTU [professional and technical school], sent to a neuropathologist.

"Although the young man has good marks on his diploma, he apparently has a weak nervous system. In a tense situation he gets lost and makes a mess of things."

And he added that someone like that has no business in operator work. An operator must not only be prepared theoretically, he also must have good reactions, an excellent memory; a special search must be made for him, and when he is found he must be trained and trained...At the present stage of development of society, occupational selection is a necessity.

Training equipment has now been installed at this enterprise, with engineering psychology principles developed by associates at Yerevan State University. But it was the first training equipment for training operators in specific occupations that made it possible to come to the conclusion that such a training system is ineffective. The technology has been changed and perfected--new training equipment is necessary. "There will never be enough

money for this," emphasized one of the training center managers. And then Yerevan State University scientists developed and offered a basically new direction in the practice of operator training--psychological training equipment....

R. Aguzumtsyan, scientific manager of the Yerevan State University Engineering Psychology Laboratory, candidate of psychological sciences and docent: It is believed that if a man works poorly, then he alone is at fault for this. This is not always the case. Often in the process of work, an operator makes mistakes that lead to equipment damage and defective output, on the one hand because his psychological qualities were not taken stock of during training and, on the other hand, labor conditions making it impossible for him to work safely were created for him. Operators, who had taken a training course for work on new equipment, encountered a problem such as this at one of the major domestic chemical enterprises. In order to eliminate an emergency situation, they had to act more quickly than they had been trained for, and far from all of them could do this successfully. Only engineering psychology analysis of operator work showed the reason for this; it was hidden in the fact that the time built into the training equipment for carrying out individual operations did not correspond with the actual time that it took for these processes to be accomplished.

As a result, an emergency situation arose, leading to equipment and materials damage because of operator decisions that were several seconds late.

The formulation of psychological principles for training equipment provision is based on the fact that different types of operator activity have common characteristics: different psychological functions, quality, condition. In such a case, the training process begins with the development in the operator of a flexible, nonspecific system of skills and knowledge. Subsequently, they can be rapidly and effectively transferred to people with a specific type of work. These principles were successfully carried out by the creation of training systems for operators of chemical plants and electrical power plants and telegraph operators. Their adaptation into practice made it possible not only to save a great deal of money, but also to guarantee reliability and safety of technological processes.

L. Dubovoy, candidate of technical sciences, corresponding secretary of the Penza division of the USSR Psychologists' Society: Solution to the problem of teachers is no less important for the training process. It is already clear at this point that operator and instructor are links in the same chain. While the former occupation has not been hurt by the attention of the engineering psychologists, the latter was "above suspicion" for a long time. The thesis of the infallibility of the instructor, passed down from aviation, was not doubted for a long time. When the number of students receiving "twos" for lack of quick-wittedness in actual situations began to grow, the engineering psychologists turned their attention to the instructor. The studies showed that during the age of the scientific and technical revolution, the instructor must not be simply an experienced specialist but, figuratively speaking, must be an operator himself, directing the training

system. His work presumes the presence of psychological qualities characteristic of a man at the control panel of automated systems on the one hand, and qualities characteristic of the work of an educator, on the other.

V. Goryachev, chief of the training equipment department of the State Scientific Research Institute of Civil Aviation and candidate of technical sciences: aviation without training equipment is impossible. A pilot must be prepared for his work not only under normal conditions, but also for situations that he might encounter once in a lifetime and perhaps never. For example, let us say that the landing gear support doesn't come down while landing. He has to land on one "leg." In order to save the passengers, the pilot must hold the airplane "suspended" with the help of the airfoils--at high speed. Then he must smoothly lower the wing toward the ground. Or, let us say that the front wheel doesn't come down. A TU-154 is running along the strip on the landing gear bases. The nose of the vehicle is at a height of several meters. He must precisely feel the moment at which the force of the airfoils drops and smoothly lower the nose to the landing strip. This is a highly specialized skill. Moreover, the pilot must bear a great psychological burden. This was simply not taught earlier. In such a case each pilot had to rely solely on his experience and on the acuity of his "sixth sense." The TU-154 training equipment now installed at Vnukovo Airport makes it possible to fully simulate such situations. Seated in the cabin, pilot and instructor see a three-dimensional representation of a take-off and landing runway. A moveable platform on which the cabin is installed makes it possible to simulate even the airplane nose hitting the runway during an emergency. Certainly a pilot trained in this manner can better handle an emergency situation should one develop.

We anticipate the appearance in the future of even more improved training equipment, with expanded capabilities for simulating situations.

V. Venda, doctor of psychological sciences and professor at the USSR Academy of Sciences Psychology Institute: Actually, the problem of instructor and student interaction is an acute one. I feel that the success of the training depends much more on the teacher than it does the student. From this point of view, I would call occupational selection a temporary measure. When we learn how to properly organize the training process, everyone will be able to handle the occupation he dreams of. That is, in principle, people should not be matched up to existing training methods but on the contrary, each should be trained individually, adapting the training process to the person. Speaking of this, by the way, a new psychological training theory called "transformation" has been created at our institute. According to it, one can, figuratively speaking, teach anybody anything. (Of course, I am speaking of normal, ordinary people. A blind man, for example, cannot be a chauffeur.) It is just necessary to correctly choose the sequence of change of teaching strategies. Let us say that a man can learn to read first by letters, then by syllables, by words, and finally by entire paragraphs and even by pages--i.e., to master speed reading. There are people who are in a position to interpret words right away. Others (and there are examples of these) read by letters their entire lives. But both of them can learn



speed reading if the teaching process is properly constructed. Technical facilities, of course, play an enormous role in this. I will present only one example: Children with poor vision cannot strain their vision for a long time. Special schools exist for them, where the lesson is several times shorter than recess. One of our associates developed a television; on its screen "written" texts and pictures appear in special form. They are adapted to the vision of a specific child. Now children with such poor vision can study normally, comprehending the school program in the same time periods as in regular schools. That is, it can be said that improving the teaching process can provide better mutual adaptation of man and the social environment and bring the strivings of the individual and the needs of society into harmonious agreement. This, of course, depends on opportunities of a purely economic character, the technical level attained, etc, but the main way has been found.

12262

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THEORETICAL AND APPLIED PROBLEMS OF VACCINE PROPHYLAXIS OF ACUTE VIRAL INFECTION

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 8, Aug 84 (manuscript received 5 Nov 83) pp 8-13

SMORODINTSEV, A. A. and MAYOROVA, L. P., Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad

[Abstract] Soviet virologists have contributed greatly to the study of the two main problems of viral infection immunology: 1) discovery of the specifics of the protective reactions of the body against viral infections; and 2) creation of new preparations for effective vaccine prophylaxis of human viral infections. This review discusses these two major aspects of vaccine prophylaxis as revealed in the literature. Major factors involved in viral defense include the level of resistance of cells and tissues to viruses, lymphocyte and macrophage activity, the speed and intensity of development of interferon, the content of such protective proteins and complement and other viral inhibitors and the effect of the fever reaction, harmful to viruses. The details of these defense mechanisms are discussed. The major mechanisms of specific defense are related to cooperative participation of the triad of immune system cells: B and T lymphocytes and macrophages, which perform the three main functions of cellular and humoral defense: 1) formation of inflammatory lymphocyte-macrophage reactions; 2) synthesis of virus-neutralizing antibodies; and 3) development of increasing concentrations of gamma-interferon which regulates and humoral specific reactions. The immediate future tasks in the area of improvement of vaccine prophylaxis of human viral diseases are: improvement and increasing effectiveness of live influenza vaccine by genetic recombination, production of vaccine strains with a broader antigen spectrum; increasing the stability of live vaccines against influenza, measles, epidemic parotitis and other viral infections, their resistance to the long-term effects of unfavorable temperatures during transportation and storage; development of combined programs for immunization against all these diseases to significantly reduce influenza morbidity and eliminate measles and parotitis by the year 2000; development of methods of cultivation of the hepatitis A pathogen in cell cultures to support the preparation of vaccine strains and live vaccines for oral immunization; and development of associated live vaccines for mass immunization against influenza, adenovirus and mycoplasma infections. References 36: 30 Russian, 6 Western.

[1603-6508]

UDC: 616.94-053.31-06:616.831.9-022.7:579.862.1]-02

METHODOLOGIC APPROACHES TO CONSTRUCTION OF CHEMICAL VACCINES AGAINST BACTERIAL INFECTIONS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 8, Aug 84 (manuscript received 17 Jan 83) pp 3-8

KOSTYUKOVA, N. N. and YEZENCHUK, Yu. V., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Chemical or molecular vaccines are immunizing preparations based on the protective antigens of pathogenic microorganisms, antigenic substances causing the development of specific antibodies capable of rendering one of the pathogenic functions of the pathogen harmless. It is now known that the entire toxin molecule is not needed to create antitoxic immunity; the antigenic determinants are located in the acceptor subunit of the toxin. This review does not discuss anatoxins. Attention is given to vaccines based on protector antigens which act as pathogenic factors in bacteria, supporting the initial stages of the infectious process--adhesion and colonization. Chemical vaccines must meet the following requirements: they must contain a protective antigen acting as one of the pathogenic factors; the preparation must be harmless; the polymer which is the immunizing base must not be in a depolymerized state; it must retain its initial native structure; serologic specificity must not be narrow; the preparation must be effective regardless of the age of persons inoculated; and the preparation must be free of ballast impurities and any other active impurities. Preference is given to chemical vaccines which prevent the initial stages of the infectious process and thus prevent not only infection but carrying of bacteria. References 60: 18 Russian, 42 Western. [1603-6508]

UDC: 614.47+616.9-085.37-039.71]:615.37.07

PRESSING PROBLEMS OF IMMUNOPROPHYLAXIS OF INFECTIOUS DISEASES AND STANDARDIZATION OF MEDICAL IMMUNOBIOLOGICAL PREPARATIONS

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 7, Jul 84 (manuscript received 14 Dec 83) pp 29-33

SERGIYEV, V. P. and DZAGUROV, S. G., USSR Ministry of Health; State Scientific Research Institute of Standardization of Testing of Medical Biological Preparations imeni L. A. Tarasevich, Moscow

[Abstract] A high percentage of children in Latvia and Estonia, Moldavia, Belorussia and the RSFSR are not vaccinated, including 30 to 50% not vaccinated against diphtheria by 1 year of age, 30 to 58% not vaccinated against polio. This has resulted in an increase in morbidity in these areas. A planned transition is suggested from short-run production of

immunobiological preparations to long-run mass production of standardized preparations for use throughout the nation. Vaccination strategies in terms of the sequence of contingents of citizens to be vaccinated for various disease should also be planned on a national basis.  
[1593-6508]

UDC 612.017.4-06:613.863

#### INTERLEUKIN-2 IN STRESS-INDUCED IMMUNE PATHOLOGY

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 278, No 3, Sep 84  
(manuscript received 23 Mar 84) pp 762-765

SUKHIKH, G.T., MALAYTSEV, V. V. and BOGDANOVA, I.M., Scientific Research Institute of Human Morphology, USSR Academy of Medical Sciences, Moscow

[Abstract] The effects of stress on interleukin-2 (IL) production by splenocytes were studied in BALB/c mice immobilized for 12 h by the method of H. Selye, in order to determine the involvement of IL in stress-induced immune pathology. Assay studies on mice stressed for 12 h showed that ConA-induced production of IL decreased by 30-53% within the first 24 h, and continued to decline at the same rate for the next 24 h. Thereafter, the decline was more gradual for the next 5 days or so. By day 7 an increase in IL production was evident to levels 7-13% below baseline. These observations provide the first experimental indication of stress-induced decrease in IL production, presumably due to stress-induced elevation of glucocorticoid levels, and indicate that IL may be one of the factors involved in immune system pathogenesis under such conditions. Figures 1; references 15: 2 Russian, 13 Western.

[1562-12172]

UDC: 615.373:578.832.1].012.6.083.33

#### PRODUCTION OF HYPERIMMUNE SERA AND IMMUNE ASCITIC FLUIDS FOR INFLUENZA VIRUS M. PROTEIN IN IMMUNIZATION WITH PROTEIN-POLYELECTROLYTE CONJUGATE

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 12 Jan 84) pp 271-273

PETROV, R. V., KHAITOV, R. M., BUKRINSKAYA, A. G., NEKRASOV, A.V., LIOZNER, A. L., VORKUNOVA, G. K. and NORIMOV, A. Sh., Institute of Immunology, USSR Ministry of Health; Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences; Central Institute for Advanced Training of Physicians, Moscow

[Abstract] A study was made of the production of immune sera and the possibility of combining immunization by a protein-polyelectrolyte conjugate with the production of immune ascitic fluid (IAF) in mice, allowing a significant

increase in the number of monospecific antibodies. Protein M was obtained from purified A/Texas/1/77 influenza virus. The protein-M-polyelectrolyte conjugate was obtained by acylation in the presence of water-soluble carbodiimide with a copolymer of acrylic acid and N-vinylpyrrolidone. Experiments were performed with a preparation containing 0.25 mg protein per mg of conjugate. Immunization of mice with the conjugate was accompanied by very active antibody formation (IAF + serum titer over 10,000) in both inbred and outbred mice. Administration of protein M alone did not result in antibody formation. The use of this method of producing IAF in combination with highly effective immunization makes it possible to prepare preparations of antibodies to M protein not only for research and clinical-diagnostic, but also for production purposes. Figure 1; references 6: 3 Russian, 3 Western.  
[1599-6508]

UDC: 578.891:578.74].083.3

#### DETERMINATION OF HEPATITIS B VIRUS SURFACE ANTIGEN (HBsAg) BY IMMUNO-ENZYME ANALYSIS METHOD

Moscow VOPROSY VIROSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 28 Sep '83) pp 319-323

ARAKELOV, S. A.; MIKHAYLOV, M. I., ANAN'YEV, V. A., STAKHANOVA, V. M., DZANTIYEV, B.B., and YEGOROV, A. M., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences; Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences; Department of Chemistry, Moscow State University imeni M. V. Lomonosov, Moscow

[Abstract] The authors set themselves the task of developing a method of immuno-enzyme analysis and comparing the effectiveness of the method with existing clinical methods of detecting HBsAg. The variation of parameters of the method as a function of the use of various preparations used as enzyme marker, methods of preparing the immuno-enzyme conjugates, nature of the substrate and type of solid phase base was studied. To simplify the method of production of conjugates, their effectiveness was compared when produced individually and without separation of nonbonded peroxidase preparations. The experiments showed that there were no significant differences in P/O values. The reproducibility and accuracy of the method was found to depend on the properties of the material used as the solid phase. The new method and the radioimmune assay method were found to be comparable in sensitivity. Figure 1; references 17: 7 Russian, 10 Western.  
[1599-6508]

COMBINED ANTIVIRAL EFFECT OF SYNTHETIC POLYRIBONUCLEOTIDE INTERFERON INDUCERS AND SPECIFIC ANTIVIRAL ANTIBODIES IN ARBOVIRUS INFECTIONS

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 24 Oct 83) pp 334-337

VILNER, L. M., LASHKEVICH, V. A., TIKHOMIROVA-SIDOROVA, N. S., KOGAN, E. M. and TIMKOVSKY, A. L., Institute of Poliomyelitis and Viral Encephalitis, USSR Academy of Medical Sciences, Moscow; Institute of High Molecular Weight Compounds, USSR Academy of Sciences, Leningrad

[Abstract] A poly(G)-poly(C) complex with molecular mass  $2 \cdot 10^6$  daltons with gamma globulin against tick-borne encephalitis and rabbit immune serum specific for Sindbis virus was used in the study. BALB/c mice were infected with tick-borne encephalitis virus 100 LD<sub>50</sub> subcutaneously before and after intraperitoneal injection of gamma-globulin and the interferon inducer. The antiviral effect of poly-(G)-poly(C) was studied as a function of dose when administered to mice 24 hours before infection. At 12.5 µg/mouse it did not significantly reduce mortality of the mice in the first 15 days after infection. The protective effect was significant at 25 µg/mouse and still greater at higher doses. Comparable results were obtained by the use of gamma globulin at 1:12,800. Poly-(G)-poly-(C) and gamma globulin yielded significantly greater protective effect when administered in combination. The authors proposed that the additive effect results from summation of the levels of reduction in reproduction of the virus by specific antibodies (direct inactivation) and poly-(G)-poly-(C) (interferon induction). Figures 4; references 7: 3 Rusan, 4 Western.  
[1599-6508]

IMMUNITY INDICES IMMUNIZED WITH VARIOUS JAPANESE ENCEPHALITIS VACCINES

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 10 Oct 83) pp 337-342

PERVIKOV, Yu. V., ELBERT, L. B., KARASEVA, P. S., (deceased) and LISIISINA, Ye. A., Institute of Poliomyelitis and Viral Encephalitis, USSR Academy of Medical Sciences, Moscow

[Abstract] Various new inactivated Japanese encephalitis vaccines have been developed recently in the USSR. This article reports study of the mechanism of the immune response in the vaccination process using these preparations. The protective activity was determined from the resistance index of test mice, i.e., the difference in LD<sub>50</sub> of the Japanese encephalitis virus in immune and control nonimmune groups of animals. A status of specific resistance was obtained by immunization with both culture and brain vaccines. A clear

protective effect was achieved only after double administration of the preparations, but no additional protective effect was achieved by a third injection. An adoptive immunity transfer test demonstrated that the specific antiviral nonsusceptibility induced by inactivated Japanese encephalitis vaccines results primarily from B lymphocytes, the protective activity of which increases under conditions of cooperative interaction with T lymphocytes. The culture virus was superior in all tests in terms of capability to induce the process of antibody formation. The results indicate that revaccination after the body contains specific antibodies in high concentration (after second vaccination) is not desirable, leading to no further specific protection. Figures 2; references 15: 11 Russian, 4 Western.  
[1599-6508]

UDC: 615.371:578.824.11/.012

#### USE OF RADIAL HEMOLYSIS REACTION FOR TITRATION OF ANTIRABIES SERA

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 4 May 83) pp 360-361

ZGURSKAYA, G. N., SELIMOV, M. A., AKSENOVA, T. A. and KULIKOVA, L. G.,  
Institute of Poliomyelitis and Viral Encephalites, USSR Academy of Medical Sciences, Moscow

[Abstract] Results are presented from comparative titration of antirabies antibodies by the neutralization reaction, indirect hemagglutination reaction and radial hemolysis reaction, the latter introduced as a rapid, technically simple and specific method of titration of antirabies sera in vitro. A linear dependence was found between the level of antibodies and size of hemolysis zone of erythrocytes, the diameter of the erythrocyte hemolysis zone increasing with increasing antibody concentration. A hemolysis zone diameter of 4 mm indicates the terminal concentration of antibodies. Full correlation of the results of the three methods was observed. This confirms the specificity of the new method and demonstrates the possibility of using this rapid, economical and simple method for titration of antirabies sera at research and practical virologic laboratories. Figure 1; references 6: 4 Russian, 2 Western.  
[1599-6508]

## LASER EFFECTS

### LASER AND MAGNETOTHERAPY AT NEUROLOGY INSTITUTE

Minsk SOVETSKAYA BELORUSSIYA in Russian 2 Nov 84 p 3

[Excerpt] In 60 years, the Belorussian Scientific Research Institute of Neurology, Neurosurgery and Physiotherapy has grown from modestly equipped laboratories which employed only 50 associates into one of our country's largest research centers. The USSR's chief institute for the problem "Diseases of the Peripheral Nervous System", this institute directs and coordinates the scientific activities of dozens of the country's medical institutions which are engaged in the study of these disorders.

Associates of the institute have defended about 70 candidate and doctoral dissertations during the post-war period alone, and the latest methods for diagnosing and treating diseases of cerebral vessels have been introduced into medical practice, original devices that facilitate the work of surgeons have been designed, and principles involved in the administration of medicines with the aid of ultrasound have been studied in clinical conditions for the first time.

New methods of laser and pulse therapy also have been developed, and biological and therapeutic effects of magnetic fields are being studied at the institute. A magnetotherapy consultative center which was organized here is working on introducing this development at medical institutions of the republic. The study of human biological fields is another new research direction. Relationships between characteristics of bioelectric fields and the condition of the human organism have been determined which are very important for medical specialists.

All of these achievements were mentioned by participants in a ceremonial meeting of associates of the institute and of the republic scientific societies of neuropathologists, psychiatrists, neurosurgeons, physiotherapists and health-resort specialists, which took place in Minsk on November 1. N. Ye. Savchenko, member of the Belorussian Academy of Sciences and republic Minister of Health, opened the meeting with introductory remarks. I. P. Antonov, member of the Belorussian academy and director of the institute, gave a report.

FTD/SNAP  
CSO: 1840/101



## TASHKENT CONFERENCE ON IMMUNOTHERAPY METHODS

Tashkent PRAVDA VOSTOKA in Russian 27 Oct 84 p 4

[Text] Scientists of Uzbekistan have developed so-called immuno-suppressors--new substances which promote the acceptance of transplanted organs, chiefly kidneys. These substances were obtained based on presence of gossypol in the cotton plant. Their widespread use will make it possible to dispense with a number of costly preparations which our country has been purchasing abroad. These facts were discussed at an All-Union conference, "Present-Day Methods of Immunotherapy", which ended in Tashkent on October 26.

The participants in this conference included N. I. Nisevich, member of the USSR Academy of Medical Sciences; V. P. Lozovoy, corresponding member of the academy; other prominent scientists from Moscow, Novosibirsk and the Union republics; and specialists from Bulgaria and the U.S.A. They discussed timely problems of immunology, examined methods for the development of new medicinal preparations and shared experience.

"The meeting in Tashkent outlined ways of solving one of the most important problems of modern immunology--developing a unified picture of the functioning of the body's defensive properties," noted R. V. Petrov, member of the USSR Academy of Medical Sciences and director of the Institute of Immunology. "Much work in this direction is being done by scientists of Uzbekistan. It was precisely here that the first republic society of immunologists was created a year ago. The opening of an affiliate of our institute is planned in Tashkent."

S. U. Sultanova, deputy chairman of the Uzbek SSR Council of Ministers, took part in the work of the conference.

FTD/SNAP  
CSO: 1840/101

EXPERIMENTAL AND CLINICAL ASPECTS OF MAGNETOLASER THERAPY

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian  
No 3, May-Jun 84 (manuscript received 28 Apr 83) pp 49-52

POLONSKIY, A. K., SOKLAKOV, A. I., CHERKASOV, A. V., NEMTSEV, I. Z.,  
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Stomatological Institute, Russian SFSR Ministry of Public Health

[Abstract] The combined effect of a magnetic field and low-intensity laser radiation on healing of skin wounds was studied under experimental and clinical conditions. Guinea pigs with trophic ulcers arising after autotransplantation of a portion of the femur were treated with circular ferrite magnets, applied to the wound area, with a magnetic field of 25-30 mT and with a helium-neon laser ( $2.5-3 \text{ mW/cm}^2$ ) daily for 3 min until wounds healed. Patients with trophic ulcers on lower extremities, open finger fractures, or infected skin wounds were given the same treatment with magnets (25-30 mT) and a helium-neon laser ( $2.5-4.5 \text{ mW/cm}^2$ ) in visible red and IR regions of spectrum (wavelength of  $0.63-0.89 \mu\text{m}$ ) for 5 min for a total of 8-10 treatments. Best experimental and clinical results were obtained with the combined use of magnetic and laser treatment, as demonstrated by the more rapid healing of wounds and cytological findings. The combined treatment accelerated and intensified bone tissue repair, granulation and epithelialization of wounds, and reduced treatment time by 1.5-2-fold in comparison with laser treatment alone. IR radiation had a more beneficial effect than red radiation. The development of a special semiconductor laser made outpatient treatment feasible as well. The basis for the beneficial effect is the prevention of recombination of charged ion particles and activation of metabolic processes. References 8: 7 Russian, 1 Western.  
[1521-9307]

## LASER CHOLECYSTECTOMY

Moscow SOVETSKAYA MEDITSINA in Russian No 6, Jun 84 (manuscript received 11 Apr 84) pp 39-43

SKOBELKIN, O.K., professor, BREKHOV, Ye.I., NOVRUZOV, F.Kh., YAKIMENKO, A.P. and YELISEYENKO, V.I., 4th Main Administration, USSR Ministry of Health, Moscow

[Abstract] Based on experimental studies on outbred dogs and analysis of the causes of death following cholecystectomies, Skalpel-1 CO<sub>2</sub> laser was employed for laser cholecystectomy in 48 patients. Following gallbladder resection with the laser scalpel, the gallbladder bed was treated with defocused laser to minimize trauma and control bleeding. Laser cholecystectomy was essentially a bloodless procedure which ensured accelerated healing due to minimal tissue trauma under the circumstances, and recovery of normal peristalsis within a day, in most cases. Ultrasonography revealed essentially normal anatomy and the absence of high density foci. Laser surgery can, therefore, be recommended for the management of gallbladder pathology, with treatment of the gallbladder bed with the defocused laser diminishing inflammatory changes and hemorrhage. References 20: 14 Russian, 6 Western. [1543-12172]

UDC: 612.112.94:615.849.19]:578.085.23

## EFFECT OF LOW INTENSITY LASER RADIATION ON LYMPHOCYTE CULTURES

Minsk ZDRAVOOKHRANENIYE BELORUSII in Russian No 8, Aug 84 (manuscript received 28 Nov 83) pp 32-35

LOBANOV, V. V. and MURZENOK, P. P., Third Department of Surgical Disease, (headed by Professor N. K. Voytenov), Minsk Medical Institute; Belorussian Scientific Research Institute of Blood Transfusion

[Abstract] A study was made of the influence of low intensity laser radiation on the activity of lymphoid cells in vitro. The influence of laser radiation on synthesis of DNA in cultures of intact lymphocytes was studied. The effect of laser radiation on proliferation of lymphocytes, induced phytohemagglutinins (FHA) as well as the possible influence of human serum components on lymphoid cells when exposed to laser radiation were investigated. Low intensity laser radiation was found to stimulate the synthesis of DNA both in serum-free cultures of intact lymphocytes and in lymphocytes stimulated by phytohemagglutinin for the first 24 minutes. Subsequent irradiation produced a depression in proliferative activity of the lymphocytes. When lymphocytes were irradiated and cultured in a serum medium in all cases there was an increase in synthesis of DNA by lymphocytes for 24 minutes, and when intact lymphocytes were used the effect continued after 24 minutes

as well. Low intensity laser radiation thus stimulates the proliferative activity of lymphoid cells for the first 24 minutes of irradiation. Figures 2; references 14: 11 Russian, 3 Western.  
[870-6508]

UDC: 616.718.41-001.512-089.818.3:616-073.524

#### USE OF LASER-X-RAY-PHOTODENSITOMETRY IN ORTHOPEDIC PRACTICE

Minsk ZDRAVOOKHRANENIYE BELORUSII in Russian No 8, Aug 84 (manuscript received 17 Nov 83) pp 59-61

GRIGOR'YEV, L. Ya., NAUMOVICH, A. S., TESAKOV, D. K. and KOREN', M. N., Department of Chromatology, Orthopedics and Military Field Surgery (headed by Professor A. S. Kryuk), Minsk Medical Institute; 6th Minsk City Clinical Hospital (chief physician - honored physician of the BSSR L. A. Yemel'yanov)

[Abstract] A special photometer created in the student design bureau of Minsk Medical Institute using a model LG-75 laser as the light source was used to study the dynamics of bone tissue density during elongation of a femur. The photometer was mounted on an N-48 negatoscope. The instrument has 2 ranges of measurements. Laser x-ray photodensitometry is performed directly on the negatoscope in daylight with adjustable screen illumination allowing rapid orientation among the areas of the x-ray picture being studied. 87 x-rays of 12 patients 12 to 14 years of age were studied. It was found that distraction epiphiseolysis causes changes in bone density in all areas of the femur. At first the effect of the cumulation of density in neighboring areas of the femur is observed with the reverse process during the period of fixation and loading. The laser x-ray photodensitometry method of studying the density of bone tissue during elongation of an extremity allows an objective approach to be made to determine the optical loading time. References 7 (Russian).  
[870-6508]

PRESSING PROBLEMS OF RELATIONSHIP BETWEEN MARXIST PHILOSOPHY AND MODERN  
MEDICINE

Kazan KAZANSKIY MEDITSINSKIY ZHURNAL in Russian No 4, Jul-Aug 84 (signed to  
press 1 Aug 84) pp 241-246

[Article<sup>1</sup> by Professor R. G. Baltanov, Honored Scientist of TaSSR]

[Text] Problems of man's interaction with the world around him and of human essence acquire much acuity and are advanced to the front edge of modern science under conditions of the current scientific and technological revolution and social progress, which have complicated significantly the relations between man and nature, individual and society.

Socrates believed that investigation of man is the first and foremost task of science. Hence his famous thesis, "know thyself." The study of man is a complicated scientific problem that requires an integrated approach combining the natural sciences and humanities (biology, anatomy, physiology, medicine, philosophy, psychology, sociology, anthropology, demography, ethnography, ethics, esthetics and others).

Marxist-Leninist philosophy, which organically combines the materialistic and dialectical methods of cognition, is the scientific methodology for studying the problem of man. The June (1983) Plenum of the CPSU Central Committee paid special attention to questions of methodological significance of the basic principles of materialistic dialectics. Dialectical materialism emerges as the methodological foundation of medicine, which permits proper determination and solution of the complicated problems of human health and sickness.

Modern medicine is one of the most developed and differentiated branches of science, and it numbers more than 300 independent scientific disciplines. With the existing tendency toward differentiation of medical knowledge and complication of research tasks, in-depth development of methodological problems and general theory, which is called upon to integrate into a single whole the numerous branches of the science dealing with human health and sickness, is of first and foremost significance. In the search for general theory and definition of methodological principles, medicine inevitably turns to dialectical materialism, the only scientific philosophical system that interprets correctly the fundamental problems of the essence of man, his

biological and social nature. In turn, medicine, which provides the richest material for comprehension of the nature and vital functions of man, helps interpret philosophically the essence of man.

The correlation between philosophy and medicine had been manifested already at the dawn of development of scientific knowledge. In 500 BC, the founder of medicine, Hippocrates, observed that these branches of knowledge cannot manage without one another. Philosophy provides medicine with general truths, while medicine delivers facts for philosophical generalizations. Hippocrates stated: "The physician who is a physician and philosopher merits the greatest praise."

The history of philosophy and history of medicine indicate that many outstanding scientists worked concurrently and successfully on both philosophical and medical problems (Galen, Avicenna, Descartes, I. I. Mechnikov, I. M. Sechenov, I. P. Pavlov and others). Broad erudition enabled them to examine problems more deeply and originally than scientists of narrow orientation working in only one branch of knowledge.

In Soviet science, which is based on Marxist-Leninist methodology, the thesis that there is an organic relationship between dialectical-materialistic philosophy and medicine emerges as an important theoretical principle that guides scientists in their research. The most prominent figures in our medicine repeatedly mentioned that philosophy was necessary in order to solve the most important medical problems. A. A. Bogomolets wrote that a large volume of facts of considerable scientific value that has not been submitted to Marxist-Leninist methodological processing creates the confusion observed in theoretical medicine.

Modern medicine is confronted with difficult problems of preventing and treating diseases, which are aimed at providing man with active longevity. Man is the supreme and most complex product of development of the material world. For this reason, it is both the most difficult and most noble scientific problem to learn about his essence, patterns of vital functions under normal and pathological conditions. The difficulty of learning about man consists of the fact that all forms of movement of matter are represented in him, in dialectical interrelationship--mechanical, physical, chemical, biological and social. Their organic interpenetration provides for man's vital functions, and the higher forms of movement are based on lower ones, but do not constitute the sum of the latter.

The most important problem of modern medicine is referable to diseases of the heart and vessels, which are the cause of death of at least 3 million people per year. Cardiac function is very complex, and it comprises mechanical, physical, chemical and biological processes. Man's social life, his endeavors, recreation, living conditions, domestic relations and emotions have an enormous influence on the function of the heart. Under favorable social conditions, the risk of acquiring cardiovascular disease is considerably smaller than under unfavorable ones. For example, different living conditions are the cause of 3-fold greater incidence of essential hypertension in urban areas than in rural ones. In the United States, essential hypertension is encountered among men 25 to 34 years of age twice as often as in the USSR

(Moscow). According to the data of American authors, almost 25% of the U.S. population suffer from various cardiovascular diseases. While the mortality rate due to cardiovascular diseases constituted only 11% in the USSR in 1939, this index has risen to 52% at the present time.<sup>2</sup> "Myocardial infarction is being increasingly observed among young people and, not only at the age of 40-45 years, but from 30 to 40. This trend of 'rejuvenation' of myocardial infarction is inherent in all economically developed countries."<sup>3</sup>

At the present time, two main types of pathology have distinctly emerged in the world: so-called nonepidemic type of pathology in economically developed countries of Europe, North America, Japan, Australia and New Zealand, while the epidemic type has retained its significance in developing countries (most countries of Asia, Africa, Latin America). In addition, a third, intermediate type of pathology is evident in such countries as Spain, Portugal, Turkey, Mexico and a few others. In brief, since the appearance of human society diseases have been constant companions of our lives, and Academician A. P. Avtsyn believes that death due to diseases is the rule, while so-called natural (physiological) death is an extremely rare exception.

Comprehensive investigation of man is based on fundamental sciences--philosophy, mechanics, physics, chemistry, biology and mathematics. Use of modern equipment is related to the broad penetration of cybernetics into medical theory and practice.

In a sense, Marxist-Leninist philosophy is a collective concept that consists of several independent philosophical sciences. Dialectical and historical materialism are its principal content. Logic, ethics, esthetics, scientific atheism, applied sociology, philosophical problems of natural sciences and history of philosophy are referable to the philosophical sciences. Man in his relations to nature and society is in the center of philosophical science, as a biological being, on the one hand, and a social one, on the other. Marxist philosophy examines man in dialectical correlation between biological and social elements, as a biosocial being, overcoming metaphysical interpretation which unilaterally considers human nature from either biological or social positions.

Man is also the object of investigation of medical science; its realm includes questions of identification, treatment and prevention of diseases, preservation of health and work capacity of people.

The philosophical thesis of man's biosocial nature applies entirely to medicine and is the starting point for comprehension of the nature of disease. K. Marx viewed the essence of man as the aggregate of all social relations. "Man is the world of mankind, government, society," he indicated.<sup>4</sup> The human personality, all of its functions are formed by a specific social environment which guides and controls all forms and manifestations of human life. Health or its lack is ultimately determined by living, working, recreational conditions, extent of satisfaction of man's physical and spiritual needs, which in turn depend on socioeconomic conditions. Marx said that disease is life with confined freedom. It should be assumed that man's life depends primarily on social conditions, which control physical and spiritual development of the personality.

The statute of the World Health Organization defines health as a "state of complete physical, mental and social wellbeing." It is quite obvious that man's wellbeing in all these areas is determined by economic conditions, the sociopolitical system of society, ideological and interpersonal relations. In brief, the health status reflects the natural and social environment of people's life. The natural environment is water, soil, air, climate, etc., and the social refers to nature of work, social relations, housing, education, etc. They are intricately interwoven. Man, who constitutes only 0.0002% of living things on our planet altered his environment through his transforming activities; he created a second "humanized" environment, the noosphere, which is governed by his social interests (new substances, types of energy, types of work, that he had previously not encountered). These new substances, types of energy and varieties of labor were developed in a short historical time, while man adapted to the environment through prolonged evolution. For this reason, there are considerable contradictions between the noosphere and established biological nature of man, which affect vital functions. The well-known Soviet internist, Ye. M. Tareyev, writes that new diseases have been discovered and have occurred in the last 100 years: "infectious diseases ... with specific epidemiology and prophylaxis; genetic, with even more complex prophylactic problems; endocrine, allergic, toxic, including radiation induced; toxicallergic, which are increasing due to the many chemicals that did not exist before in man's environment...."<sup>5</sup>

It must be noted that, under modern conditions, major contradictions have emerged between biological development and social formation of man. Biologically, man matures considerably earlier than he is formed as a complete personality. Social development of personality is related to the system of education, rearing, training for different types of labor and social activities.

The contradictions between man's biological and social formation lead to a number of diseases--neuroses, psychoses; they often lead to sexual disorders, fertility and ultimately have an adverse effect on the solution of demographic problems, etc. Wise arrangement of social life in strict accordance with the biological nature of man will make it possible to rid society of many diseases.

Each of the numerous medical disciplines has world-view and methodological aspects, and for this reason logically has philosophical problems. Let us examine this thesis on the example of the three main branches of medicine.

Biomedical disciplines (morphological, biochemistry, physiology, pharmacology and others). All of them are essentially a part of the corresponding biological sciences. The most important philosophical problems are concentrated in biology: specifics of biological form of movement of matter, essence, origin and evolution of life, relationships between the body and the environment, etc. In particular, the discovery of the cell and Darwin's evolutionary theory served as the natural scientific foundation for validation by Marx and Engels of the basic principles of dialectical materialism. There is an entire set of philosophical questions related to problems dealing with the role of biological factors in social life, relationship between nature and society, heredity and adaptability in man's development. Characterizing modern genetics and its relation to Marxist-Leninist philosophy, Academician N. P. Dubinin



writes: "In our time, gigantic accumulation of facts is proceeding in genetics and we are gaining deeper understanding of the essence of life. This is helping in the development of general theory of genetics, clarification of conformity of its principles to the laws of dialectical materialism."<sup>6</sup>

Pathology occupies a central place among the biomedical disciplines; it is a combined science that studies the patterns of onset, treatment and outcome of disease and individual morbid processes in man and animals. Since pathology deals with general patterns of disease, it is justifiably called the "philosophy of medicine," which provides the key to comprehension of the essence of concrete diseases. Pathology is based on philosophical principles of the biological and social aspects of human nature, the influence of the natural and social environment on formation and development of the body and personality, correlations between mechanical, physical, chemical and biological processes in pathological changes, etc. The well-known Soviet scientist, I. V. Davydovskiy, repeatedly stressed in his works that the theoretical level of general conceptions in medicine is directly dependent on philosophy. Thus, philosophy and biology being very closely connected to one another emerge as the general theoretical and methodological basis for scientific analysis of problems of medical science.

Clinical disciplines dealing with human diseases, their treatment and prevention. All of them have philosophical problems, in particular those of integrity of the body, causative determination of disease, theory of diagnosis, which are based on principles of dialectical logic, clinical thinking, deontology, social determination of the mind and mental diseases. Let us take, for example, psychiatry, the discipline that is concerned with the causes and essence of mental illness, its manifestations, course, methods of treatment and prevention. The well-known Russian psychiatrist, S. S. Korsakov, indicated that, of all the medical sciences, psychiatry is the one that brings us closest to philosophical questions. Psychiatry is based on dialectical-materialistic consideration of the mind as the property of highly organized matter to actively reflect reality and, according to it, control man's behavior. Proper philosophical understanding of problems of relationship between the material and ideal, physiological and psychological, social determination of the mind make it possible to correctly define the nature of mental diseases and develop optimum methods of treating and preventing them. Although mental processes are also formed as a result of brain activity and, in this sense, represent its function, they exceed the limits of physiology and are determined by the subject's attitude toward life around him. Since man lives in a social environment, mental diseases require both physiological and sociological analysis.

Sociomedical and hygienic disciplines that deal with effects of the environment on the body and develop measures to improve the health of the people. The problem of correlation between the environment and man is one of the aspects of the basic philosophical question of relationship of thinking to living, man to the world. As applied to society, the basic philosophical question is formulated as a general sociological law of the deciding role of social living in relation to social awareness. According to Marxist teaching on the essence of man as an aggregate of all social relations, health and pathology of man reflect his social life, and health care problems are entirely determined by the socioeconomic structure of society. Public health care is one of the social benefits that can be achieved only if

man is socially free. By protecting man's health, the physician has a direct influence on the basic spheres of society: economics, social relations and spiritual life. The nature of health care is determined by the social regime of society and state. It is written in the CPSU Program that a socialist state is the only state that takes on the concern of protecting and constantly improving the health of all the people. Scientific quality, no cost and availability to all of qualified medical care, the preventive orientation, involvement of the community in safeguarding the health of the working people are the basic principles of socialistic health care. As part of the social system, public health care is a sociological category governed by general laws of development of society. Hence the logical link between medicine and social sciences, which is based on philosophical science--historical materialism or Marxist general sociological theory.

The complexity of problems confronting medical science determines the nature of thinking of a medical scientist and practicing physician. Since the human body is a complicated dynamic system consisting of numerous interacting organs and processes, it must be studied by the dialectical method. This method of cognition is based on recognition of development and correlation of all objects and phenomena in life. The principle of development in its medical aspect requires investigation of disease from the moment it appears, as well as determination of the causes that generate pathological phenomena. "To establish the cause of a disease, eliminate it and prevent it in the future--that is the meaning of medicine," writes the well-known Austria scientist, Hugo Glaser.<sup>7</sup> Causal thinking, i.e., determination of causes has its own specifics. Arbitrary and arbitrarily categorical conclusions, in which the course of reasoning proceeds from cause to basis, emerge as the logical form of causal thinking. The conclusions derived are hypothetical, probabilistic. For this reason, hypothesis occupies a large place in clinical thinking. Determination of causes of diseases and formulation of a diagnosis are always related to formulation of hypotheses, the validity of which must be checked comprehensively.

In clinical thinking, there is organic blending of all types of conclusions, in particular deduction, when individual facts are related to known general bases, and induction, when generalizing conclusions are derived on the basis of individual facts. There are no grounds to try to develop a predominant style of thinking in a clinician, for example, inductive, since induction and deduction are most intimately interwoven in the thinking process, and they are virtually not used separately. Conclusions by analogy occupy a significant place in clinical thinking, which are based on comparing similar phenomena that have signs in common (for example, patients with the same diseases). Complete analogy yields reliable conclusions, but in practice it is extremely rare. More often, one observes incomplete analogy (for example, there are virtually no absolutely similar people), the conclusions of which are probabilistic, problematic. For this reason, the same disease progresses differently in different people, and there is logical validation of the requirement of medicine "to treat the patient and not the disease." The principle of an individual approach to a patient emerges as a mandatory condition for effective treatment.

Investigation of the logic of clinical thinking is an important problem of modern medicine. Knowledge of it is necessary, in the first place, for formation of thinking of the scientific and practicing physician and, in the second

place, to develop programs for computer diagnosis of diseases, mathematical models of diseases, etc.

With all their uniqueness, the routes of cognition in medicine are governed by the general laws of man's cognition of the world, which are explored in Marxist-Leninist gnosiology. Gnosiology of dialectical materialism is based on the Leninist thesis that the dialectical route of learning the truth, objective reality, proceeds from active contemplation to abstract thinking, and from it to practice. In medicine this pattern is expressed in the fact that the physician divides his actions into four stages: gathering a history, examination, making a diagnosis and treatment. Information about the patient's living conditions prior to his present illness is gathered on the basis of reports by the patient or people around him. This must be done very thoroughly, in order to obtain objective data through the patient's subjective sensations and perceptions. The patient's sensations do not necessarily correspond to the real signs of a disease (for example, phantom pain), and for this reason taking a history requires in-depth knowledge about the human body and the patient's psychology.

After taking the history, determination is made of objective changes by examining the organs and parts of the body that are probably involved in the disease. The examination is made by inspection, palpation, auscultation, percussion and, if necessary, the physician uses special procedures (x-rays, electrocardiogram, laboratory tests, etc.).

The necessary data to make a diagnosis are gathered by means of taking the history and performing an examination, i.e., there is a transition from the sensory to rational step of cognition, "from active contemplation to abstract thinking." The purpose of diagnostication is to identify the disease, and very often the initial diagnosis is tentative, and it is pinpointed in the course of further observation, examination, consultations with specialists and treatment. Making a correct diagnosis is a mandatory prerequisite for effective treatment. There are enormous obstacles, which are related to the complexity of the human body and difficulties of cognitive activity, on the road toward the correct diagnosis.

Practice, patient treatment, emerges as the final judge that decides on the accuracy or inaccuracy of the diagnosis. The accuracy of a diagnosis is checked most particularly in case of surgical intervention, when the internal organs become accessible to direct observation.

The philosophical thesis of absolute and relative significance of practice as a criterion of truth has a direct bearing on medicine. The absolute nature of practice as the criterion of truth consists of the fact that it always and constantly performs its function of checking the accuracy of theoretical theses. The relativity of practice refers to the fact that, in each specific case, it is limited by the time factor and for this reason is incomplete, unfinished (for example, the correct diagnosis and proper treatment are ineffective when the disease is far-advanced).

Practice emerges not only as the goal of cognition and criterion of truth, but as the basis of cognition, since it is impossible to succeed in gaining

knowledge about objects and phenomena in life apart from man's practical endeavors. In the medical aspect, patient examination, which precedes diagnosis, is nothing other than practical actions aimed at identifying the essence of a disease. A purely contemplative route, without empirical investigation of the patient, will never enable medicine to achieve the needed effect with regard to identifying and curing diseases. The dialectical principle of correlation in the human body is manifested by the fact that diseases of individual organs affect the function of the body as a whole and are reflected in all of its functions. At the same time, the course and nature of pathological processes in different organs depend on the body's general condition. For this reason, treatment of local diseases is related to treatment of the body as a whole.

The alliance of philosophy and medicine is a mandatory prerequisite for in-depth scientific cognition of the essence of man and formation of a harmoniously developed personality that organically combines physical perfection with intellectual wealth. For philosophy to become an effective tool in the hands of physicians, one must improve the scientific sophistication of the physician, equip him with the necessary knowledge in the area of dialectical and historical materialism, sociology, logic, ethics, esthetics, etc. Formation of philosophical refinement in a physician should be just as important as studying special disciplines and inculcation of practical skills in therapeutic work. For this purpose, it is necessary not only to improve and expand the study of philosophical sciences, but make comprehensive use of the philosophical potential contained in general scientific disciplines and medical sciences. Through philosophy to medicine and through medicine to philosophy--such is the route of learning about man as a biosocial being and the most complicated object of scientific investigation.

In his article, "Significance of Militant Materialism," V. I. Lenin wrote about the need for "solid philosophical validation" for the natural sciences. V. I. Lenin viewed a powerful means of learning about and transforming nature, society and man in the organic alliance of philosophy and natural sciences. On the basis of Lenin's theoretical legacy, the 26th CPSU Congress determined that cognition of the mechanism of physiological, biochemical, genetic and immunological processes of human vital functions, refinement of methods of prevention, diagnosis and treatment of the most widespread diseases emerges as an important task for the natural sciences.

A mandatory condition for solving these complicated problems is proper methodology of scientific research, in the capacity of which Marxist-Leninist philosophy emerges.

#### FOOTNOTES

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## ADAPTATION PERIOD DURING EXPOSURE TO ORGANOCHLORINE COMPOUNDS

Kazan KAZANSKIY MEDITSINSKIY ZHURNAL in Russian No 4, Jul-Aug 84 (signed to press 1 Aug 84) pp 305-306

[Article by P. R. Komarov and N. V. Kalashchenko (Ufa)]

[Text] Our objective was to investigate the supply of free amino acids and sulfur-containing compounds in blood serum as a function of work tenure in healthy workers exposed to the combination of chlorinated benzenes, phenols, cresols, 2M-4KhP amine salt, hexachlorane, hexachlorobutadione, chlorex, dichloroethane, methaldehyde, monochloroacetic acid and others on the level of their maximum allowable concentrations.

We had 253 people (141 men and 112 women) under observation for 10 years. The control group consisted of people who had not been in contact with toxic agents. All of the subjects ranged in age from 20 to 50 years (in the main group, individuals 20 to 39 years old constituted 84% and in the control, 81%).

Blood serum free amino acids were assayed by descending chromatography, activity of sulfhydryl groups by amperometric titration, total, reduced and oxidized glutathiones by the method of Woodward and Frey.

The dynamics of parameters of amino acids and thiol compounds are listed in the Table.

Analysis of our results shows that there is some tendency toward change in store of free amino acids and thiol compounds as a function of duration of low-intensity exposure to a combination of organochlorine compounds. In the first place, there were two phases demonstrable in the adaptation period, according to indicators for some amino acids and thiol compounds. The first phase of the adaptation period is a phase of adverse effects of organochlorine compounds on workers, and it lasts for 2 to 5 years. The second, habituation phase, starts essentially after 5 years of contact with organochlorine compounds in low concentrations. Such a phasic nature of the parameters studied characterizes the effects of low-intensity factors, but does not demonstrate the specificity of the observed disturbances. In the second place, thiol compounds and some amino acids (cystine, cysteine, tyrosine,  $\gamma$ -aminobutyric acid, valine, glutamic acid, asparagine) are the most sensitive to exposure to chemicals.

Dynamics of parameters of blood serum free amino acids and thiol compounds in workers in the chemical industry as related to work tenure

Parameters, $\mu\text{mol}/\ell$	Control group	Mean values		
		main group tenure, years		
		up to 2	2-5	5-10
Cystine	337.1 $\pm$ 3.7	223.8 $\pm$ 28.7	250.0 $\pm$ 43.3	288.8 $\pm$ 101.3
Ornithine	237.1 $\pm$ 55.3	202.3 $\pm$ 16.7	200.8 $\pm$ 15.9	242.4 $\pm$ 98.5
Threonine	568.9 $\pm$ 47.1	574.8 $\pm$ 58.8	638.7 $\pm$ 69.7	579.8 $\pm$ 25.2
Alanine	342.7 $\pm$ 32.6	311.3 $\pm$ 55.1	325.8 $\pm$ 51.7	453.9 $\pm$ 92.1
Tyrosine	121.5 $\pm$ 16.0	74.0 $\pm$ 7.2*	76.2 $\pm$ 7.7*	116.0 $\pm$ 16.6
Gamma-aminobutyric acid	223.3 $\pm$ 26.2	115.5 $\pm$ 8.7*	117.9 $\pm$ 13.6*	203.9 $\pm$ 14.6
Valine	92.3 $\pm$ 6.8	65.8 $\pm$ 5.1*	66.7 $\pm$ 6.0*	106.8 $\pm$ 10.3
Phenylalanine	26.1 $\pm$ 4.8	32.1 $\pm$ 4.2*	38.2 $\pm$ 4.8*	29.7 $\pm$ 4.2
Leucine	61.8 $\pm$ 6.1	61.8 $\pm$ 8.4	61.8 $\pm$ 6.9	63.4 $\pm$ 6.1
Aspartic acid	227.8 $\pm$ 27.1	162.4 $\pm$ 26.3*	191.7 $\pm$ 29.3	194.7 $\pm$ 44.4
Glutamic acid	112.9 $\pm$ 11.6	37.4 $\pm$ 6.1*	42.9 $\pm$ 5.4*	89.8 $\pm$ 8.2
Asparagine	413.6 $\pm$ 35.6	290.9 $\pm$ 24.2*	312.9 $\pm$ 23.5	427.3 $\pm$ 65.1
Glutamine	162.3 $\pm$ 9.6	139.0 $\pm$ 6.8*	141.8 $\pm$ 15.7	172.6 $\pm$ 16.4
Glycine	370.7 $\pm$ 34.7	324.0 $\pm$ 33.3	326.7 $\pm$ 34.7	288.0 $\pm$ 106.7
Serine	64.8 $\pm$ 7.6	53.3 $\pm$ 8.6	58.1 $\pm$ 7.6	67.6 $\pm$ 6.7
Sulfhydryl groups	805.0 $\pm$ 13	580.0 $\pm$ 30*	646.0 $\pm$ 20*	639.0 $\pm$ 11*
Total glutathione, mg/ $\ell$	516.0 $\pm$ 21	392.0 $\pm$ 17*	651.0 $\pm$ 11*	508.0 $\pm$ 48
Reduced glutathione, mg/ $\ell$	461.0 $\pm$ 30	296.0 $\pm$ 17*	347.0 $\pm$ 24*	458.0 $\pm$ 16
Oxidized glutathione, mg/ $\ell$	56.0 $\pm$ 15	93.0 $\pm$ 6*	107.0 $\pm$ 11*	58.0 $\pm$ 10

\*Results are statistically reliable.

On the basis of the foregoing, it can be concluded that exposure to low-intensity organochlorine compounds elicits adaptation phases in state of homeostasis of amino acid metabolism and redox processes in workers, which could serve as an indicator of early intoxication, and could also characterize working conditions.

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## Q FEVER IN ELDERLY AND CHILDREN

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pp 306-308

[Article by V. F. Terent'yev, V. Ye. Rychnev, N. A. Ryaskin and Ye. N. Ishina  
(Voronezh)]

[Text] The relative rarity of Q fever in childhood and among the elderly prompted us to analyze the incidence of this infection and furnish a comparative description of its clinical course.

In a 30-year period of recording the disease, there was an insignificant share of cases among children and the elderly. However, a screening of these categories of people using two immunological tests--complement fixation reaction (CFR) and cutaneous allergy test (CAT) with Burnett antigen--in endemic rural regions of Voronezh Oblast revealed strongly positive results. Thus, the CAT and CFR were recorded in 44.0 and 7.1% of retirees, respectively, and 23.8 and 8.3% in children. During a period of outbreak of Q fever of aerogenous origin (through goat fur) children constituted 20% of the patients.

In addition, they presented higher percentages of positive results than adults (CFR and CAT for children in the 4th-7th grades were demonstrated in 67.9 and 46.1%). Q fever was not diagnosed promptly, and it was documented in only one-third the cases. There was no history of febrile disease clinically resembling Q fever in 43% of the children with seropositive reactions. These findings indicate, on the one hand, that there is a higher incidence of infection with *Coxiella Burnetii* in the extreme age groups, in spite of the official statistical data and, on the other hand, that there can be an asymptomatic, latent course of infection among inhabitants of areas that are endemic for this zoonosis.

Our processing included the results of screening patients 60 to 87 years old and children 11 months to 15 years of age. There was prevalence of women among the elderly patients, which is not typical of Q fever and apparently reflects the distinctions of demographic status at that age. There was prevalence of residents of villages and rayon settlements in both age groups.

The course of Q fever was mainly benign. Moderate severe and severe course of illness was observed among the elderly. Conversely, there was prevalence



(68%) of mild forms in children. The indicators were similar for incidence of recurrences and pneumonia. Most often, pneumonia was associated with moderate well-marked clinical symptoms, particularly among the elderly. Pneumonia was mostly bilateral. As an exception, the pneumonia variant of the disease in children was very mild and its identification was based on roentgenoscopic findings.

It is important to mention that in the two compared groups, the symptomatology of illness as a whole conformed to that of young and middle-aged individuals. At the same time, onset of the disease was subacute (26.4%) among the elderly and acute (89.2%) among children. Subsequently, the disease acquired the typical features of this infection: appearance of fever associated with chills and sensation of heat, arthralgia and myalgia, headache, hyperhidrosis, facial hyperemia, enlargement of the liver and spleen, relative bradycardia. No doubt, the diverse background diseases among the elderly could not fail to affect the clinical findings. Among them, we encountered the most often cardiovascular diseases, diabetes mellitus, pathology of the bile-producing system, atherosclerosis, obesity and others. In all of the children Q fever occurred against a favorable background. Among the elderly, there was joint and muscle pain, as well as manifestations of toxicosis (vertigo, insomnia, adynamia) considerably more often. Cough and bradycardia were observed in 50% of them. There was the same incidence of dyspeptic signs, tachycardia and hepatolienal syndrome. Infectious-toxic shock of grade I-II and disorientation, which were present during the febrile period, were found in 10.5% of the elderly subjects. There were rather frequent complications of the disease or therapy (26%)--myocarditis, pleurisy, cholecystitis, toxicallergic dermatitis. In one case, there was serous meningitis and uveitis. While the temperature was most often at the 39-40° level (in both groups), it lasted twice as long among the elderly as in the children. Subfebrility upon termination of the main febrile wave was also found more often and for longer periods of time among the elderly. Considerable asthenization in both the acute period of illness and convalescence period was inherent in the elderly. Marked weakness and perspiration often lasted several weeks after discharge from the hospital in that group. In children, we often observed scleritis and conjunctivitis, hyperemia of the face (84.2%), not infrequent tachycardia (36.8%), and the hepatolienal syndrome (78.9%) was of diagnostic importance. Such symptoms as dyspnea, vomiting, abdominal pain and diarrhea were found in 21.1%, which is apparently the distinction of the body's nonspecific reaction to infection.

Recurrences in the two groups were mostly milder and shorter than the main period of illness. There were 1-2 recurrences, which developed on the average after 3-5 days of apyrexia, and lasted about 4-5 days. In some cases, the second wave was longer and more severe than the first.

In all cases, the diagnosis of Q fever was confirmed by a positive CFR. Antibody titer ranged from 1:20 to 1:320. Mean antibody level was lower in the elderly than in children and middle-aged patients. In most of the elderly cases, it did not exceed 1:80-1:160. Dispensary follow-up of convalescing cases also revealed earlier change of CFR to a seronegative phase in the elderly. In both age groups, antibodies to Burnett antigen were demonstrable with greater consistency in the 2d-3d weeks of illness. In some cases, a

positive CFR was first demonstrated in the 4th-5th weeks among elderly patients and 4th-7th weeks in children.

The hemogram of elderly patients was characterized by relatively frequent leukocytosis (32%). Lymphopenia was observed reliably more often in elderly individuals than in children (58 and 22%, respectively). In this case, lymphocyte content constituted 8-15%. Relative lymphopenia at the early stage of the disease corresponded to seronegative results or low titers in the CFR. There were general toxic changes in urine, which sometimes reflected the body's reaction to infection or presence of concomitant disease (in the elderly). Deviations of biochemical parameters in the elderly patients were manifested in some cases by an increase in alanine aminotransferase activity, hyperbilirubinemia and azotemia.

Tetracycline, levomycetin and penicillin were used the most often to treat patients. Tetracycline and rifampicin demonstrated greater therapeutic efficacy. In most cases, initially prescribed penicillin and levomycetin had to be replaced. Among pathogenetic therapy agents, we used those in the butazolidine class and glucocorticosteroids.

Duration of illness constituted a mean of 25.3 and 13.1 days in the elderly and children, respectively. All cases recovered.

Thus, Q fever among the elderly and children in regions that are endemic for this disease is not a rare occurrence. Fuller detection of patients or individuals with a history of this disease is possible only with use of immunological methods (CFR, CAT) because of the difficulty in diagnosing this infection.

In essence, the extreme age groups of patients--children and elderly people--endure Q fever analogously to young and middle-aged patients. At the same time, there may be variations of clinical parameters in these groups, as well as in severity of onset of the disease, frequency of recurrence and complications, titers of antibodies and rate of their decline. Consequently, it is necessary to conduct more frequent dynamic screening of these population groups, particularly among rural residents, with use of the CFR with Burnett's antigen.

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## REVIEW OF BOOK ON MEDICAL GENETICS FOR PHYSICIANS

Kazan KAZANSKIY MEDITSINSKIY ZHURNAL in Russian No 4, Jul-Aug 84  
p 314-315

[Review by Professor V. Ye. Anisimov and R. M. Shakirzyanova, candidate of medical sciences (Moscow) of book by Ye. T. Lil'in, Ye. A. Bogomazov and P. B. Gofman-Kadoshnikov, "Meditsinskaya genetika dlya vrachey" (Medical Genetics for Physicians), Moscow, Izdatel'stvo Meditsina, 1983]

[Text] Human genetics may provide an inestimable service to the practicing physician in diagnosing and treating many diseases, as well as preventing them in relatives of patients. However, it is quite difficult for every physician to acquire sufficient knowledge in medical genetics, since the books by well-known Soviet scientists in this field, Ye. F. Davidenkova, N. P. Bochkov and other researchers are intended primarily for specialists in medical genetics.

For this reason, the book being reviewed will be of definite interest to physicians in all specialties. The authors comment with justification in this book that the achievement of medical genetics in the 1970's is rejection of "large jump" tactics, according to which one could control heredity by means of gene engineering in the near future and expect a radical breakthrough in pathogenetic treatment of hereditary diseases. At present it is apparent to everyone that human genetics is one of the most complicated sections of biology. The authors of this book stress the fact that planned fact gathering and development of new, more refined methods of genetic analysis, which permit different interpretation of theory of inheritance of diverse characters in man, have replaced broadly announced promises.

The book acquaints physicians, within the necessary limits, with general issues--content of the subject and its problems, hereditary pathology, role of heredity and environment in pathogenesis of disease, and the general patterns of pathogenesis of such diseases.

Various methods are used to study inheritance of man's normal and pathological traits: genetic, twin and population. The authors analyze the advantages and limitations of each of them. The combined use of these three principal methods enables the physician to reliably describe, in most cases, genetic determination, type of inheritance and distribution of genetic diseases of man.

At the present time, chromosome diseases are rather widespread (25% of the entire world's hospital beds). They include diseases that are caused by both quantitative and structural changes in chromosomes or a combination of the two, which is demonstrable in the course of karyological examination of a patient in special laboratories upon analysis of cell nuclei.

The book furnishes information about chromosomes, their types and offers an idea about karyotype and the karyological method, which is the most accurate and reliable cytological examination for patients and their family members. The physician must refer a patient and his relatives for cytogenetic tests if there are multiple congenital developmental defects with involvement of three or more systems of the body, mental and physical retardation, premature birth, spontaneous miscarriages and sterility, impairment of sexual development.

The authors tell readers about the most frequent chromosome diseases: Down's disease, Patau's, Turner-Shereshovskiy's, "cri du chat," Klinefelter's, triple X syndromes, sex chromosome anomalies, etc. These autosomal and sex chromosome anomalies are of definite interest to clinical practice, since it is impossible to diagnose them reliably without thorough cytogenetic examination and, consequently, to predict the birth of a second sick child to the same family. In such cases, in the authors' opinion, medical-genetic consultations are needed. They offer some interesting information about control of biological processes which is possible only with knowledge of the molecular bases of genetic pathology and enzymopathies.

Very recently, there was scepticism about the possibility of treating hereditary diseases. However, at the present time, after development of a number of specific and in some cases highly effective treatment methods, the prognosis for many diseases has improved considerably. The authors of the book confirm this, citing convincing data on replacement therapy, vitamin therapy, diet and surgical management of chromosome diseases and congenital enzymopathies.

They have also touched upon such an important issue of modern medicine as hereditary defects in enzyme systems, which are demonstrable with intake of drugs. Analysis of the causes of atypical reactions to drugs has shown that, from the genetic point of view, they are similar to congenital metabolic defects. There is also discussion of atypical reactions to drugs in the presence of hereditary metabolic diseases. It was noted that pharmacogenetic research is called upon to play an important part in solving problems of symptomatology, pharmacology and genetics. Its results will help physicians and their patients in avoiding complications related to drug therapy.

Since medicogenetic consultation is one of the forms of specialized medical care, in the last section of the book the authors analyze the main stages of such important medical examination, dominant and recessive types of inheritance, passive and active forms of such consultations.

In our opinion, the clinical section on chromosome diseases, congenital enzymopathies and their treatment should have been covered somewhat more broadly and in greater detail.

The authors have written a needed and useful book at a good time, and it will no doubt become a desk reference in the physician's practice.

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## ARTIFICIAL HEART

Moscow TASS in English 18 Oct 84

[Text] Super-pure plutonium-238 can become a reliable source of energy which would make a completely implanted artificial heart go for several years, Soviet scientists believe. During fission, that radioisotope emits heat which can be converted to mechanical energy to power an artificial heart.

Three artificial heart models have been developed at the Moscow Institute of Transplantology and artificial organs, which cooperated in that project with a number of engineering institutes and factories, TASS has been told by the institute's director Valeriy Shumakov, a corresponding member of the USSR Academy of Medical Sciences.

Extensive research has been conducted to decide if it is safe to implant such a radioisotope source into the body, from the point of view of the diffusion of extra heat generated by it (plutonium generates more heat than is needed by the artificial heart.)

Valeriy Shumakov said that the models of the artificial heart had been working for quite some time on stands and that models had been developed for implantation in animals.

Plutonium, of course, is not the only solution to this very complex problem, Shumakov continued. The search for an energy source is being carried out in several areas. In particular, a model of the artificial heart with an electrohydraulic drive is being developed. The energy source of the type of a power battery, which can be changed from time to time, can be affixed, for instance, to the patient's midriff. The principle of induction is being used in this case to transmit energy to the artificial heart. Some types of this model are to be studied experimentally on animals.

The development of a fully-implanted artificial heart calls for the solution of many complex problems, Shumakov said. Perhaps, an interim solution will be provided by a backpack apparatus. We plan to expand studies in this area. One of the problems is to find materials which could withstand for several years the intensive work done by the human heart with its roughly 40 million beats a year. Another problem is to develop miniature pacemakers for the artificial heart which could also be implanted in the body. There is no

commonly accepted algorithm so far to give an artificial heart a sensitive reaction to the varied needs of the body in blood supply on a par with the natural heart.

All these are complex problems but, in principle, it is possible to resolve each of them, Shumakov said. He believes that an artificial heart of this type will be developed at the beginning of the next century. It is not a utopia but a scientific forecast, he stressed.

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ELECTRIC STIMULATION OF VESTIBULAR ANALYZER DURING PHOTOELECTRIC  
RECORDING OF EYE MOVEMENTS

Moscow VESTNIK OTORINOLARINGOLOGII in Russian No 5, Sep-Oct 84 (manuscript received 2 Mar 84) pp 3-7

[Article by Professor S. N. Khechinashvili, academician of the USSR Academy of Medical Sciences, B. M. Zargaryan and K. G. Karakozov, Department of Otorhinolaryngology (chief--Prof S. N. Khechinashvili, academician of the USSR Academy of Medical Sciences), Tbilisi Institute for Advanced Training of Physicians, USSR Ministry of Health]

[Text] There is a long history of use of electric stimulation to examine man's vestibular function, and enthusiasm for this technique alternated with its virtual abandonment. This is attributable mainly to the possibility of affecting with electricity not only labyrinthine receptors and endings of the vestibular nerve, but its fibers, cells of the vestibular ganglia and even the central vestibular regions. It is also important that electronystagmography cannot be performed during electric stimulation. At the same time, electrostimulation has some methodological advantages over adequate and caloric stimulation of the labyrinth, namely, feasibility of instantaneous and very fine graded effect on vestibular afferent impulsation that is not directly related to its changes due to acceleration of gravity. For this reason, the method of electric stimulation found application for testing vestibular function during spaceflights [1-5, 7, 8, 13-15, 27], whereas refinement of photoelectric methods of studying eye movements has expanded in recent years the opportunities for its use in clinical practice [6, 10-12, 16, 17, 19-26].

Since 1977, we are using for clinical examination of the vestibular analyzer a photoelectronystagmograph (Author Certificate No 760944, 1978--"Device for Recording Angles of Eye Movement") and an electrostimulator (Certificate for Innovative Proposal No 18, 1978--"Device for Electric Stimulation of the Vestibular Analyzer"), which were designed for this purpose [10-12].

The photoelectronystagmograph (Figure 1) operates in the following manner: the light from the light source (brand AL-107 A light-emitting diode, which operates in the infrared part of the spectrum) is directed to the distal end of a fiber cord and illuminates the section of the eye on the boundary between the iris and sclera, near the internal canthus. The light flux reflected from the surface of the eye, which is picked up by the central end

of the fiber cord and passes through a polarizer to a photodetector (FEU-28), is partially polarized, which causes a change in angle of polarization when the eye moves due to the curvature of the surface of the examined segment of the eyeball. There is also a change in quantity of light flux traversing the polarizer. For this reason, when the eye moves there is a change in signal in the photodetector due to change in curvature of the examined surface of the eye in the area of transition from iris to sclera. Moreover, the difference in reflectivity of the iris and sclera also leads to change in light flux passing to the photodetector when the eye moves.

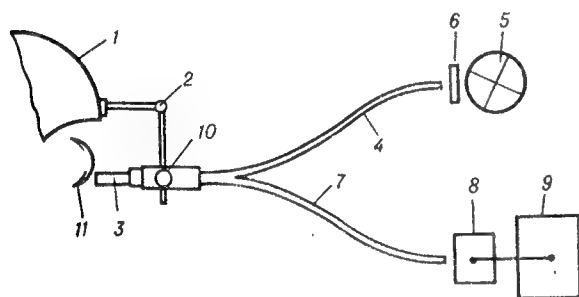


Figure 1.

Diagram of device for recording angles of eye movement

- 1) helmet
- 2) swivel joint
- 3) central end
- 4) outgoing end
- 5) light source
- 6) polarizer
- 7) return
- 8) photodetector
- 9) recording instrument
- 10) fine adjustment screw
- 11) segment of eye examined

The flexible double light guide makes it possible to make better use of the light source and sensitive photoelectric multiplier, and by securing the light guide and FEU on the subject's head, it rules out entirely the influence of random head movements of the subject in relation to the light source and photodetector on the results of the tests.

The swivel joint, which is equipped with a fine adjustment screw, makes it possible to place the central end of the light guide at the required angle and required distance from the surface of the eye. Linearity of the obtained parameters of eye movements is in the range of 0.5 to 8 degrees, which satisfies entirely the requirements for recording galvanic nystagmus, the amplitude of which is in this range.

Use of a light source (light-emitting diode AL-107 A), photodetector (FEU-28 with oxygen-cesium-silver photocathode)

and coherent fiber cord operating in virtually the same spectrum enabled us to achieve a high degree of sensitivity in the device. The spectral characteristics of the source (light-emitting diode) were so matched as to have maximum radiation in the region of maximum sensitivity of the photocathode and maximum light transmission of the fiber.

Use of an infrared light source enabled us to conduct the examination in total darkness, i.e., under conditions that ruled out entirely the influence of fixing the glance and illumination on the nature of nystagmus, which plays a substantial role in examination of the vestibular analyzer. According to the data of C. Pfaltz and M. Koike [19], spontaneous or evoked eye movements diminish to 1/5th-1/10th in the light. Moreover, by using the fiber cord in the device, we ruled out entirely the thermal effect of infrared radiation on the eye. The irritating effect of infrared radiation is usually manifested by lacrimation, which causes reflex blinking and alters the degree of light absorption and light reflection in the tested eye. Our device permits



preservation of binocular vision during the examination because the central end of the fiber bundle is directed to the area where the iris changes to sclera near the internal canthus at a distance of 2-3 mm from the surface of the eye. The output signal is calibrated by change in distance from the central end of the light guide to the surface of the eye and change in flux of light by means of the light-emitting diode potentiometer.

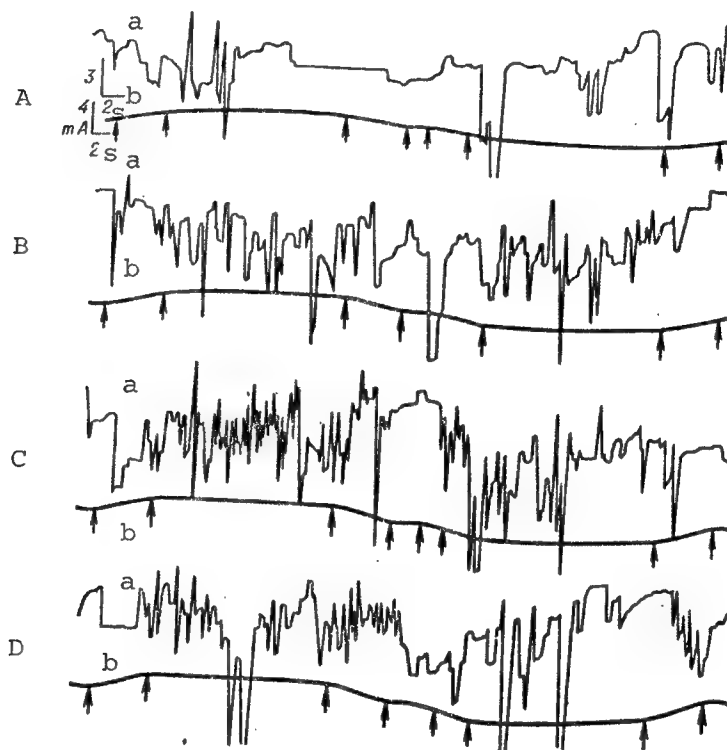


Figure 2. Tracing of galvanic nystagmus (a) in patient with chronic epimesotympanitis on the left with different intensities of stimulation (b): A--2 mA, B--3 mA, C--4 mA, D--5 mA. Left--location of electrodes in position I, right--in position II. In both halves of the bottom curve--anterior and posterior fronts, two plateaus; X-axis, time (in s); y-axis--for tracing a--angle of eye rotation (degrees) and for curve b--current (mA)

The electrostimulator consists of a power unit (36 V batteries), automatic unit, time relay and current breaker. This instrument permits smooth, linear change over a wide range (from 2 to 30 s) in fronts of delivered pulses. The breaker permits immediate discontinuation of rise in voltage at any point of the front, with concurrent retention of given pulse duration. The distinctive feature in the method we developed is that it is possible to vary individual half-cycles of alternating current regardless of its frequency. Temporal electrodes, 30 mm in diameter, are attached on bushings to the helmet, which permits rather firm immobilization on the skin of the peritragal region. The

electrodes are wrapped in chamois, and they absorb well the sodium chloride wetting solution.

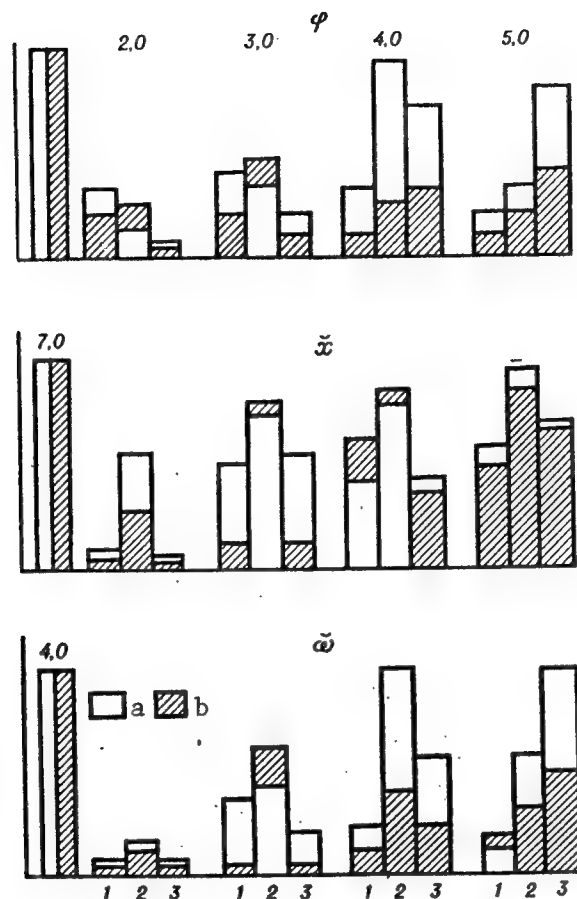


Figure 3. Parameters of galvanic nystagmus in the same patient.

The numbers above the bars refer to intensity of stimulus (mA) and those above the extreme left (scalar) bars in each row refer to: 1 Hz, 7 and 4°/s; a--position of BB-I electrodes; b--BB-II.

The numbers under the bars refer to:

- 1) during build-up of intensity of electric stimulus (anterior front)
- 2) plateau
- 3) during reduction of intensity of electric stimulus (posterior front)

Infrasonic-frequency alternating current is used to stimulate the vestibular analyzer [10-12]. Power is increased from 2 to 5 mA in 1 mA increments. The stimulating electrodes are placed biauricularly and bipolarly (BB): BB-I is with the cathode on the right ear and anode on the left; BB-II is with the cathode on the left ear and anode on the right. Figure 2 illustrates a tracing of galvanic nystagmus in a patient with chronic left-sided epimeso-

As can be seen in Figure 3, the most marked differences are observed with a current of 4 mA, and this is particularly evident on the curves of frequency and velocity of the slow phase of nystagmus. The differences can be seen the most vividly on the plateau and posterior front of stimulation.

With increase in power, with BB-I, there is gradual increase in mean frequency of nystagmus ( $f$ ) in hertz, and with BB-II it remains constant on the posterior front after reaching a maximum on the plateau. Mean amplitude ( $\bar{x}$ ) in degrees increases linearly on the anterior front and plateau, whereas it decreases on the posterior front, and this applies to both BB-I and BB-II. Mean velocity of the slow phase ( $\omega$ ) in degrees per second increases on the anterior front and plateau then remains constant with BB-I and decreases with BB-II. The value of  $\bar{x}$  undergoes qualitatively identical change with BB-I and BB-II, but quantitatively remains higher with BB-I than BB-II.

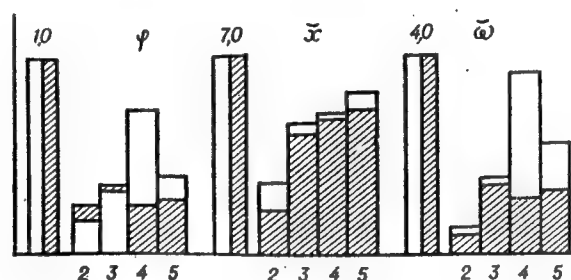


Figure 4. Averaged parameters of galvanic nystagmus in the same subject, regardless of dynamics of change in intensity of electric stimulus (arithmetic means of parameters during fronts and on plateau of stimulus with BB-I and BB-II). Designations on the scalar bars are the same as in Figure 3. Numbers under the bars refer to power (mA)

- 1) frequency of nystagmus (in Hz)
- $\bar{x}$ ) amplitude (in degrees)
- $\omega$ ) velocity of slow component (in degrees)

Frequency and velocity of the slow phase are the most important parameters of galvanic nystagmus. Moreover, there is asymmetry of functional state of the labyrinths, as manifested by predominant reduction of frequency and velocity of slow phase of galvanic nystagmus with BB-II and increase in nystagmus thresholds, as compared to BB-I (Figure 4).

In view of the fact that the cathode enhances spontaneous impulsation of the labyrinth while the anode inhibits it [9, 18], it can be concluded that the left labyrinth is functionally less excitable than the right one. The results of our studies are consistent with data [22, 23, 25, 26], according to which the threshold of nystagmus directed toward the healthy labyrinth is much lower than the threshold of nystagmus directed toward the stricken labyrinth.

Electric stimulation of the vestibular analyzer with variable-sign current at infrasonic frequency, up to 5 mA at 1 mA increments permits rapid and

good demonstration of functional asymmetry of the vestibular analyzer by comparing the parameters of galvanic nystagmus with BB-I and BB-II, among which attention should be given mainly to threshold, frequency and velocity of the slow phase of nystagmus.

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ALLERGOSES OF UPPER RESPIRATORY TRACT OF CHEMICAL GENESIS

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[Article by Professor V. Ye. Ostapkovich and V. B. Pankova, candidate of medical sciences, Department of Occupational Pathology of Ear, Nose and Throat (chief--Prof V. Ye. Ostapkovich), Scientific Research Institute of Industrial Hygiene and Occupational Diseases (director--Prof N. F. Izmerov, corresponding member of the USSR Academy of Sciences), USSR Academy of Medical Sciences, Moscow]

[Text] The increasing use of chemistry in industry and agriculture, introduction of an ever increasing assortment of new chemicals to technological processes, many of which have a sensitizing effect, have resulted in an increase in number of people exposed to some degree or other to these agents. Such industrial chemicals as p-phenylenediamine, formaldehyde, as well as its derivatives, salts of heavy metals (chromium, nickel, cobalt), manganese, colophony, lubricants, synthetic vitamins, antibiotics, diisocyanates and others have the strongest allergizing properties.

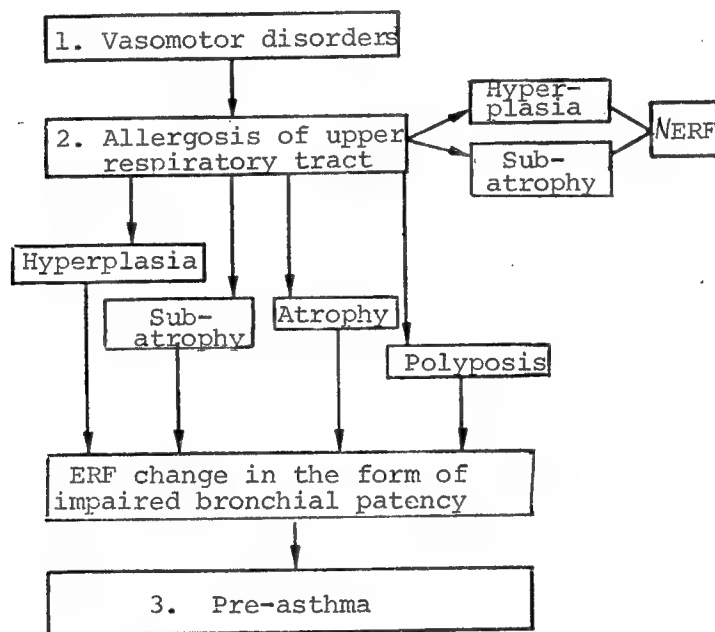
In industry, the main route of penetration of chemicals into the body is by inhalation, which impairs the barrier properties of the mucosa of the upper respiratory tract. This circumstance causes prolonged contact of agents with the mucosa, as a result of which there is development of allergic changes in the "shocked" organ and formation of allergic disease of the upper respiratory tract. Nonspecific factors are important to development of allergic diseases of the nose, larynx and throat among workers in chemical plants: microclimate, level of dust and bacteriological contamination of the air in production areas.

Allergic diseases of the upper respiratory tract of chemical genesis are encountered the most often among instrument control workers in the chemical and pharmaceutical industry and chemical combines, press operators, packers, galvanizers, laboratory technician-chemists, painters, radio assemblers and nurses. The incidence of such diseases ranges from 16 to 28% in different branches of industry.

As noted in our previous works [5, 8], there are distinctive clinical and morphological findings inherent in allergosis of the upper respiratory tract of chemical genesis. It is very rare to encounter isolated disease of the nose, throat and larynx with this form of pathology, since the pathological

changes involve rather extensive parts of the respiratory tract mucosa. In the practice of occupational pathology, one observes the most often allergic rhinopharyngitis or rhinopharyngolaryngitis, which is attributable to the prolonged inhalation effect of massive doses of allergizing chemicals on the mucosa, as well as a set of other irritating, burning and toxic agents.

At the present time, the clinical-morphological and functional distinctions of allergosis of the upper respiratory tract of chemical genesis have been grouped into a working classification, that otorhinolaryngologists and occupational pathologists use as a guideline in solving diagnostic and expert problems [9]. On the basis of this classification, a distinction is made of three clinical stages of the same pathological process in the presence of "chemical" allergic diseases of the upper respiratory tract (see Chart): vasomotor changes in the mucosa, allergosis of the upper respiratory tract and pre-asthma. Each stage by itself can be viewed as an independent disease at a specific stage of development of the allergosis.



Vasomotor changes characterize the first stage of the allergic process; they are reversible provided contact with the chemical allergen is eliminated. The main clinical signs of disease are vascular disorders, which arise under the effect of a chemical allergen that increases vascular permeability. As a result of this, the patients complain of rhinorrhea (58.8%) and paroxysms of sneezing (35.2%). As a rule, these symptoms disappear when exposure to the allergen stops; however, the mucous membrane of the nasal conchae remains pasty in 90% of the patients. Some patients present Voyachek's spots, which are indicative of vascular dystonia. The clinical signs at this stage are similar to those of neurovegetative rhinitis [2]. Indeed, neurovegetative disorders are demonstrable in 60% of the patients at this stage of disease. However, there are clinical laboratory findings (eosinophilia of peripheral

blood, high eosinophil count in impression preparations from the nose, elevated titers of antihaptene antibodies), which make it possible to diagnose the early stage of sensitization of the mucous membrane by a chemical. This is also confirmed by histological findings, such as accumulation of eosinophils and mast cells in the nasal mucosa [4]. The results of positive provocation test with chemical allergens in 84% of the patients are proof of the validity of this assumption.

When there is continued contact with a chemical that has sensitizing action, there is development of the clinically marked stage of allergosis of the upper respiratory tract. The distinctive feature of this form is manifestation of allergic signs of the process against the background of dystrophic disturbances of the mucosa of the nose, larynx and pharynx. Pathomorphological studies made on the light-optic and electron levels [5] established that there are dystrophic changes varying in severity, from hypertrophic to subatrophic and polypous processes, which determine the distinctive complaints of patients and clinical signs at this stage of disease.

With allergic diseases of the upper respiratory tract that develop against a background of hypertrophic mucosal changes, there is prevalence of constriction of nasal passages (56%) due to pastiness or edema of hyperplastic mucosal areas in the nose, with swelling of lateral toruses of the pharynx and vestibular regions of the larynx. The patients complain of difficulty in breathing through the nose (70.9%) and accumulation of mucus in the nasopharynx and posterior wall of the pharynx. Rhinorrhea, sneezing and lacrimation are seen in 67.7% of the patients, which is also reflected in microsymptoms of changes in the mucosa of the upper respiratory tract--edema, cyanosis and mosaic coloration. Profuse mucous secretions from the nose, which are associated with paroxysms of sneezing and lacrimation, disappear in part when contact with the industrial chemical is discontinued.

With allergosis associated with subatrophic changes in the mucous membrane of the upper respiratory tract, there is prevalence of complaints of dryness in the nose and throat (75.7%), nose bleeds (54.5%) and feeling of a lump in the throat. Rhinorrhea is also observed (66.6%). Clinical findings include thinning of the mucosa of the posterior pharyngeal wall (90.9%), superficially situated blood vessels in the nose, elements of atrophy of the mucosa in the region of the anterior parts of the nasal septum. Signs of an allergic process can be identified by the edema of anterior ends of the middle nasal and posterior ends of the inferior nasal conchae, islets of edematous lymphatic tissue on the posterior wall of the pharynx, pastiness and edema of parts of the larynx and uvula. In spite of the "variegated" clinical signs and prevalence of dystrophic changes in the nose, the allergic process is also taken as the basis for making a diagnosis on this group of patients. This makes it possible to demonstrate positive endonasal provocation tests with chemical allergens in 84% of the cases which, along with the demonstrated eosinophilia of peripheral blood and typical clinical signs on rhinocytograms, is indicative of allergic disease.

The most typical clinical signs of allergic pathology of the upper respiratory tract are observed in patients with polypous changes in the nose, which develop under the influence of chemicals. There is a clinical triad of symptoms, which



have been described by other authors who studied allergic diseases of non-chemical etiology [2, 6, 10]: difficulty in breathing through the nose (78%), paroxysms of sneezing and rhinorrhea (85%). Rhinoscopy reveals primarily constriction of nasal passages due to mucosal edema (92.8%), pallor and polypous changes in the central nasal conchae (78.5%). There are also varying degrees of edema in the larynx and pharynx. As a rule, the results of endonasal tests are usually positive in 100% of the cases in this group; tests are used not so much for diagnostic purposes as to answer questions of expertise.

With allergosis of the upper respiratory tract of chemical etiology, about 25% of the patients complain of dry accesses of coughing, discomfort or heaviness of the chest, sensation of shortage of air and, occasionally, episodes of asphyxia. At the same time, medical examination of these patients fails to reveal objective signs of pathology of the bronchopulmonary system. However, examination of external respiratory function (ERF) shows a decline of respiratory parameters due to change in mainly bronchial patency: parameters of maximum ventilation of the lungs, maximum rate of expiration and (Tiffno) test decline, and there is increase in bronchial resistance. A direct relationship is demonstrable between progression of changes in parameters as a function of severity of the pathological process in the upper respiratory tract. In the presence of vasomotor changes, a decline in some parameters of ERF is noted in only 60% of the patients, whereas with subatrophic and polypous changes, the signs of impaired pulmonary ventilation are marked in 85% of the cases. It should be noted that testing of ERF in the course of provocative diagnostic tests with chemical allergens revealed intensification of change in respiratory function and in a number of instances led to detection of latent functional disturbances in the bronchopulmonary system.

The above data confirm the previously voiced opinion that there is development of pre-asthma in workers in chemical plants [7], and they are indicative of the validity of distinguishing a third stage of allergosis of the upper respiratory tract of chemical etiology, i.e., pre-asthma. In our opinion, the following set of symptoms could serve as clinical and functional criteria of severity of allergic disease of the upper respiratory tract of chemical genesis, which can be evaluated as a state of occupational pre-asthma: allergic disease of the upper respiratory tract associated with dystrophic or polypous changes in the mucosa, complaints of accesses of dry cough, heaviness or discomfort in the chest, as well as persistent change in respiratory parameters, or change appearing after provocative load tests, indicative of obstructive respiratory disturbance.

Investigation of immune status is one of the important aspects in defining the pathogenetic set of symptoms of allergic diseases of the upper respiratory tract of chemical genesis. As shown by studies [3], sensitization to industrial allergens, according to indicators of all specific in vitro diagnostic tests (specific agglomeration of lymphocytes, specific microprecipitation, precipitation and hemagglutination, complement fixation, specific injury of basophils) is the most relevant at the early stages of disease, i.e., in patients with vasomotor changes. As the severity of the process increases, i.e., with appearance of subatrophic and polypous mucosal changes, sensitization to industrial allergens persists, but the severity of changes in parameters diminishes and this is most probably related to triggering of deeper

immunological, pathogenetically significant mechanisms that are instrumental in progression of the process.

This assumption was confirmed by a combined immunological study of the main elements of the immune system of patients with allergic diseases of the upper respiratory tract of chemical genesis: state of general immunity according to the cellular and humoral elements, as well as parameters of local immunity. Thus, for patients with vasomotor changes of chemical etiology, qualitative, rather than quantitative, changes in lymphocytes are typical, as manifested by decline or absence of capacity to secrete rosette-enhancing factors in response to stimulation with mitogens. There is hypersecretion of serum immunoglobulin (Ig)M,  $240 \pm 40$  mg% against the background of moderate decline of IgA to  $146 \pm 20$  mg%. These changes apparently reflect the immune system's primary reaction to an industrial allergen.

Among patients with allergosis of the upper respiratory tract of chemical etiology, which developed against a background of hypertrophic changes in the mucous membrane, one observes a decline in absolute number of B cells to  $164 \pm 19$  and T cells to  $1226 \pm 105$ , with no change and even increase in number of D cells. Some patients present normal reactions of D lymphocytes to suppressor-stimulating factor ConA and phytohemmagglutinin, i.e., there was activation of effector functions of both the T and B elements of lymphocytes, increase in concentration of IgM to  $186 \pm 29$  mg% and partial decline of IgA to  $137 \pm 16$  mg%. With the polypous form of allergosis of chemical etiology, the immunological status reflects the general tendency toward stress and activity of effector functions of lymphocytes, and their absolute count is normal. However, the decrease in number of cells with  $C_3$  receptors to  $145 \pm 25$ , high level of serum IgM-- $217 \pm 58$  mg%--and active humoral reaction for staphylococcus are indicative of substantial involvement in the process not only of cellular, but humoral immunity. In this group, the most marked decline of local immunity is also observed, i.e., IgA parameters in saliva are one-half the values in the control ( $11.6 \pm 4$  mg%). These findings are consistent with the results of other authors [11] who evaluate such changes as a sign of severity of the allergic process.

In patients with allergic disease of the upper respiratory tract against a background of subatrophic changes, we observe a distinctive immunological status, manifested by decline in number of B lymphocytes to  $184 \pm 19$ , with compensatory retention of T cell count at  $1217 \pm 66$ . At the same time, there is depression of effector function of T cells, as manifested by a less marked phytohemagglutination reaction. The level of secretory IgA is normal ( $17.0 \pm 2.4$  mg%). Thus, we should stress the selective suppression of immunity which, along with frequent acute respiratory diseases and colds noted in their history, enables us to assess these patients as the most susceptible to development of diseases of the bronchopulmonary system.

With reference to pathogenesis of allergic diseases of the upper respiratory tract of chemical genesis, we cannot fail to discuss the role of bacterial flora in their development and course. Impairment of barrier properties of the mucosa creates beneficial conditions, along with industrial factors, for penetration of bacterial allergens into the body; for this reason, concurrently with severity of the clinical process there is increase in significance of bacterial flora to development of disease. Staphylococci (up to  $70.9 \pm 8.1$ )

are the principal form of bacterial flora of the upper respiratory tract in the presence of allergic disease of chemical genesis [1]. At the same time, among the subjects examined, sensitization to influenza bacteria was found rather often ( $56.5 \pm 7.8\%$ ), in spite of the fact that there were few cultures of this microorganisms from the nose and sinuses. In view of the role of influenza bacteria in development of inflammatory diseases of the respiratory tract [12], we can consider this as an indication of retrospective microbial sensitization, showing the prior existence of inflammatory diseases of other organs and systems, as well as the respiratory tract, which could have played a negative role in development of allergosis.

To sum up the foregoing, it must be stressed that the etiology and pathogenesis of allergosis of the upper respiratory tract of chemical genesis are complex and multifaceted, which is why there are difficulties in diagnosis, expert certification of disability and prevention of this form of occupational disease of the respiratory tract.

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# SOME DISTINCTIONS TO TEACHING OTORHINOLARYNGOLOGY TO MEDICAL STUDENTS FROM DEVELOPING COUNTRIES

Moscow VESTNIK OTORINOLARINGOLOGII in Russian No 5, Sep-Oct 84 (manuscript received 16 Feb 84) pp 57-61

[Article by Professor Yu. B. Preobrazhenskiy, Otorhinolaryngology Course (chief--Prof Yu. B. Preobrazhenskiy), People's Friendship University imeni Patrice Lumumba]

[Text] Preparation of the syllabus is the most important part of teaching otorhinolaryngology, as it is in other disciplines. Of course, there should not be any basic differences in the syllabus for otorhinolaryngology for students from developing countries. The existing syllabus for medical VUZ students of the Soviet Union do not meet entirely the requirements for teaching students from developing countries. Several distinctions that the young physician will encounter must be taken into consideration.

At the present time, many Soviet otorhinolaryngologists, as well as other specialists, are working in developing countries. Obviously, they too must have some idea about the distinctions of ENT [ear, nose and throat] involvement in individuals living in those countries. For this reason, it is desirable to include in the syllabus the study of diseases that are seldom or never encountered in countries with a temperate climate, but are observed in tropical and subtropical regions. Such diseases include, for example, mucocutaneous leishmaniasis, rhinosporidiosis, blastomycosis, yaws and several others.

When preparing the syllabus (and presenting material), it is necessary to bear in mind that the students must not study only isolated lesions to ENT organs. In most cases, they are dealing with diseases that strike various organs and systems, including those referable to our specialty. Since such diseases are either never encountered in European countries, or seen very rarely, proper attention is not always given to them in student textbooks or even in manuals of otorhinolaryngology, and they are not included in the existing syllabus for medical VUZ's. It is deemed desirable to make the appropriate additions to the syllabus. One must take into consideration the distinctions of some tropical diseases. For example, in the case of mucocutaneous leishmaniasis, primary mucosal lesions are seldom encountered. In most cases, the process spreads from the skin. Obviously, the role of an otorhinolaryngologist is relatively small in early detection of this disease. However, in advanced

stages of the disease, with marked involvement of the nasal cavity, combined treatment is needed, and the otorhinolaryngologist plays a large part in determining its efficacy.

At the same time, with a disease such as rhinosporidiosis, prompt detection can be made only with a thorough and rather qualified work-up (with, of course, verification of the diagnosis by a mycologist). Even emergency care of nose bleeds, which are typical of this disease, requires certain skills that students acquire in an ENT clinic. Promptly instituted treatment of such patients could prevent development of the changes inherent in rhinosporidiosis in other parts of the respiratory tract, in the trachea and bronchi. As we know, bleeding from these organs presents a direct threat to the patient's life, and its arrest involves great difficulties and, not infrequently, extensive traumatic operations.

The following is another distinctive feature in the work of a physician in a developing country. As we know, there are faculties (institutes) in the Soviet Union that train physicians in different medical specialties--internal medicine, sanitation, hygiene, pediatrics and stomatology. However, there is virtually no such division in developing countries. The vast majority of students from developing countries are trained on therapeutic [internal medicine] faculties.

As we know, largely thanks to the help of the Soviet Union and other socialist countries, industry is developing well in many developing countries. For this reason, it is deemed desirable for students to pay proper attention to the study of occupational diseases of ENT organs and their prevention. However, since the number of hours scheduled for otorhinolaryngology is quite limited, we deliver elective lectures on occupational pathology in our field; we organize a visit to the Institute of [Industrial] Hygiene and Occupational Diseases of the USSR Academy of Medical Sciences. Similar measures can be recommended for pediatric otorhinolaryngology. For example, we have some classes with students at a city dispensary for hearing-impaired children.

Obviously, since the diseases inherent in tropical and subtropical regions are not encountered in the temperate zone, it is desirable to discuss such diseases during practical classes, with use of appropriate slides, programmed control (for which the relevant programs must be developed) and other teaching aids.

Independent study of relevant branches of medicine is very important. As for the study of occupational pathology and pediatric otorhinolaryngology, difficulties are usually not encountered in this area. In addition to the textbook of children's otorhinolaryngology by L. I. Kal'shteyn and Yu. B. Iskhaka, there is an extensive literature dealing with occupational diseases and their prevention. The situation is more problematic with regard to studying ear, nose and throat involvement associated with tropical diseases. There is very little information about ear, nose and throat involvement in such generally recognized textbooks of general pathology as the monograph by I. A. Kassirskiy et al. [1] and the work by Mahnson-Bahr [2]. The data about involvement of ENT organs in the fourth volume of the textbook of otorhinolaryngology have long since become obsolete. Evidently, it would be desirable for instructors

to prepare short manuals (as we have already done many times) to supplement the general course of otorhinolaryngology. In addition to the texts we have already mentioned [1, 2], we think it would be desirable in preparing such manuals to make use of information in the Great Medical Encyclopedia and certain guides. One must also use data that are published in periodicals.

In general, bearing in mind that students from developing countries are being trained at many medical VUZ's of the Soviet Union, we consider it desirable for the Meditsina Publishing House to put out a small manual. The situation is considerably more difficult with regard to color slides and photos. Unfortunately, the illustrations of lesions to the ear, nose and throat associated with tropical diseases are reproduced in black and white in the textbooks and articles we mentioned. Evidently, it is quite feasible to obtain color reproductions on a centralized basis through the appropriate organizations.

As we know, the nature of delivering lectures and giving explanations during clinical classes is very important to assimilation of material. Let us mention a few minor features that are rather important, as we learned in our 15 years of work with foreigners. For example, the idiomatic expressions used by an instructor are of definite help to a Soviet student in assimilating material. But foreign students, even those in their 5th year, when our specialty is taught, occasionally posed questions such as, "Why did you say that?" after a lecture during the early years of our work at the People's Friendship University imeni Patrice Lumumba. Apparently, when using some idiomatic expression, the instructor must be sure that it will be correctly and rapidly understood by the student and help learn the material. Tautology is a definite flaw in any presentation of material (be it lectures or clinical classes), but may be necessary in some cases, especially when explaining the most difficult aspects of our specialty to foreign students.

Our experience has shown that foreign students assimilate material better when it is presented in short and well-constructed sentences. At the same time, long sentences with many interjections make it considerably difficult to absorb the required material. There are also some problems with use of certain anatomical terms. As we know, a new anatomical nomenclature was approved at the 6th International Federative Congress of Anatomists in Paris, in 1955. This nomenclature was given the name of Paris nomenclature. Already in 1956, the editorial board of the Great Medical Encyclopedia decreed that the international nomenclature must be used in that collective work.

In a decree approved on 31 January 1959, the Scientific Council of the USSR Ministry of Health deemed it necessary to make standard use of Latin anatomical terms on the basis of the Paris Anatomical Nomenclature, and for this reason, virtually all of the anatomical, as well as clinical, literature in the Soviet Union has now been "translated" into this nomenclature. When teaching Soviet students, we can limit ourselves to the use of terms consistent with this nomenclature.

In the clinical literature published abroad (both educational and periodic), anatomical terms are often used that are referable to other, obsolete

nomenclatures. However, physicians of developing countries have not only our textbooks and manuals in their homeland (incidentally, they purchase them gladly and take them back with them), but textbooks written in the "second" language used in a given country. For this reason, when holding classes with medical students from developing countries it would be desirable to use both obsolete nomenclature and new terms concurrently (of course, with the appropriate comments).

Nor can one overlook the fact that there are literally only a few otorhinolaryngologists in some developing countries. For this reason, special care has to be rendered by physicians regardless of their main specialty. Being aware of this situation, most students from developing countries learn with great interest and application the methods of examining patients that are used by otorhinolaryngologists.

There are also some differences with regard to prescribing different drugs. For example, in most countries virtually no use is made of drug prescriptions that are dispensed by pharmacies and contain many constituents. Usually, patented products are used. This must be taken into consideration when learning otorhinolaryngology.

In addition, the future physicians must be warned against excessive enthusiasm for ultrafashionable products which have not been sufficiently tested, although broadly advertised. As an example, we can recall the drug, thalidamide. As we know, this product was used extensively by parturients abroad. However, as a result of taking thalidamide there were many deformed children, including some with defects of the ear.

We should like to note the following with regard to programmed control. For the first few years of our work with students we had reservations about introducing these progressive teaching methods. However, we subsequently became convinced that our fears were in vain. Students work very willingly with testing machines and do not experience any difficulties (if, of course, they are familiar with the material). This is perhaps attributable to the use of programmed control on our faculty starting in the first years.

Ideological work with foreign students is an extremely important area. Discussion of this extremely important aspect is beyond the scope of this article, but we should like to voice some views on this score too.

Of course, it is necessary to stress all the advantages of the Soviet public health system in the course of teaching otorhinolaryngology, as well as other medical disciplines. The students learn about the radical difference between our medical system and the one that exists in the capitalistic world from the very first years of training in a Soviet VUZ. However, in the course of a lecture or class, it is quite beneficial to remind them of the cardinal difference between our health care system and the ones that exist in capitalistic countries. Occasionally, when describing some surgical intervention, it is expedient to mention its cost to the patient in some capitalistic country or other.

In addition to describing the distinctions of our health care system during lectures and practical classes, informal brief talks during breaks between

classes are very beneficial. It is desirable during such talks to touch upon questions related not only to otorhinolaryngology and medicine, but all of our Soviet life and the current policies.

It is useful to remind foreign students of a typical form of advancement such as institutes for advanced training of physicians, faculties for advanced training at the leading medical VUZ's of our country where there are departments of otorhinolaryngology. In particular, we organize visits to the ENT Clinic of the Central Institute for Advanced Training of Physicians. We believe that such visits could be organized in other cities too, where there are ENT departments.

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# EFFECTIVENESS OF FERROCIN PREPARATION IN REDUCING RESORPTION OF RADIOACTIVE THALLIUM

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[Article by V. P. Borisov, L. I. Seletskaya, T. N. Skomorokhova and V. A. Popov: "On the Effectiveness of 'Ferrocine' Preparation in Reducing the Resorption of Radioactive Thallium"]

[Text] For the purpose of expanding the indications in favor of medical application of the domestic antidote for cesium and rubidium--"ferrocine" preparation  $KFe'''[Fe''(CN)_6]$ , which has been approved by the pharmacological committee of the USSR Ministry of Health for clinical application--this work presents materials on the verification of its effectiveness with thallium intoxication as compared with the foreign antitoxins to this metal--Antidotum Thallii Heyl.

Thallium salts are dangerous because, with their high toxicity, they are quickly absorbed into the organism. Unfortunately, all the presently known ligands (EDTA, DTPA, BAL, d-penicillamine) have proven to be ineffective (Heydlauf; Lund), and researchers have turned their primary attention toward finding sorbents which would limit the resorption of thallium from the digestive tract.

In seeking out selective sorbents in the sphere of analytical chemistry and hydrometallurgy for cesium, rubidium, as well as thallium, the mineral ion exchangers turned out to be especially promising (I. V. Tananayev et al). However, a long time was required to determine the possibility of application of these compounds under organism conditions. Only in the past 10-15 years has it been possible to isolate from this group of ion exchangers some prospective antitoxins in cases of cesium intoxication (N. P. Fadeyev; L. A. Il'in; Ye. V. Danetskaya et al.; L. I. Seletskaya et al.; V. P. Borisov et al., 1977, 1974; Nigrovich) or thallium intoxication (Heydlauf; Dvorak).

Early research with  $^{202}Tl$  (M. I. Bokk and L. A. Il'yin) clearly showed that the organic cationites (KU-2 and others) bond thallium well in vitro, but later desorb it in the small intestine as a result of a shift in ion equilibrium and competition with biocomplex forming agents. This research also demonstrated that mineral ion exchangers are most promising under conditions of the organism. Zirconium phosphates showed a stable effect in these tests.

However, their overall effectiveness was still insufficient (50-60 percent). Therefore, the study of the possibility of practical application of the domestic preparation "ferrocin", which has already been approved for medical use, presented definite interest in cases of thallium intoxication.

#### MATERIALS AND METHODS

Tests were conducted on 40 hybrid male white rats weighing  $220 \pm 20$  g.

A solution of  $^{202}\text{Tl}$  in a dosage of  $1.85 \cdot 10^5$  Bk per rat in a volume of 1ml was introduced by a metallic probe into the stomach of the test animals, simultaneously with the sorbent (dosage 10; 50; 100mg per rat in 2ml water). In one test the  $^{202}\text{Tl}$  was introduced intraperitoneally with a subsequent course of treatment with ferrocin.

The level of  $^{202}\text{Tl}$  deposit was evaluated by means of vital measurements of the rats on a scintillation counter with NaI(Tl) crystal as compared with a standard  $^{202}\text{Tl}$  target. The excretion of  $^{202}\text{Tl}$  was studied in the metabolic cells of the control and treated animals. Radiometry of the organs, tissues and excretions was performed on the indicated counters by  $\gamma$ -radiation from the radionuclide.

With balance computation of isotope content in the organism, the mass of blood was taken as 7.5 percent, and of muscle--45 percent of the body mass. The content in the skeleton was equal to 20-time activity of the femur.

The materials were statistically processed. In all cases a correction was made for decomposition of  $^{202}\text{Tl}$ ,  $T_{1/2}$ --12.1 days. The constants of the equations characterizing the dynamics of thallium excretion from the organism in the control and in the variants with treatment (input of individual exponents and their  $T_{\text{biol}}$ ) were determined on the basis of experimental curves by the method of graphic interpolation.

#### RESULTS AND DISCUSSION

Table 1 presents the data on the accumulation of  $^{202}\text{Tl}$  and its excretion from the organism. From these data it is evident that the greatest amount of incorporated thallium is found in the muscles, with maximum accumulation noted in the first 24 hours. Next are the gastro-intestinal tract, the kidneys and the liver. A very fast absorption of thallium from the digestive tract may be observed. By the 6th hour it is already greater than 60 percent. The character of thallium distribution is similar to the corresponding indicators for cesium (L. A. Buldakov and Yu. I. Moskalév). However, the rate of thallium excretion ( $T_{\text{biol}}$ --4.1 days) is higher. Unlike cesium, thallium is excreted from the organism primarily with the feces, and not with the urine.

A comparative evaluation of the effectiveness of ferrocin when it is used as an immediate aid (Table 2) has shown that a clearly expressed protective effect may be observed--a reduction in the deposit of the metal throughout the organism as a whole according to total measurements, and a 90-96 percent reduction in all the tissues and organs with a dose of 0.1g, a 84-92 percent reduction

with a dose of 0.05g, and up to a 72-80 percent reduction with a minimal dose of 0.01g. With analysis of the obtained data we can see that ferrocin and Antidotum Thallii Heyl proved to be equal in their effectiveness. Nickel ferrocyanide showed a somewhat higher effectiveness. Copper ferrocyanide turned out to be less active.

Table 1. Distribution and excretion of  $^{202}\text{Tl}$  after intragastric administration (data given in percentages of the administered dose,  $\text{M} \pm \text{m}$ )

1) Объект исследования	2) Срок исследования			
	3) 6 ч	4) 1 сут	5) 8 сут	6) 15 сут
7) Кровь	$0,5 \pm 0,1$	$0,59 \pm 0,05$	$0,11 \pm 0,01$	$0,06 \pm 0,01$
8) Мышцы	$27,7 \pm 1,3$	$38,7 \pm 0,4$	$13,3 \pm 1,0$	$7,0 \pm 1,5$
9) Скелет	$4,7 \pm 1,6$	$4,4 \pm 0,04$	$1,4 \pm 0,1$	$0,49 \pm 0,02$
10) Желудочно-кишечный тракт	$33,4 \pm 3,4$	$12,2 \pm 1,0$	$1,5 \pm 0,4$	$0,62 \pm 0,02$
11) Печень	$6,6 \pm 0,7$	$4,8 \pm 0,3$	$1,0 \pm 0,3$	$0,23 \pm 0,02$
12) Почки	$8,6 \pm 0,3$	$8,3 \pm 0,5$	$2,0 \pm 0,5$	$0,74 \pm 0,02$
13) Селезенка	$0,22 \pm 0,04$	$0,55 \pm 0,19$	$0,06 \pm 0,01$	$0,02 \pm 0,01$
14) Легкие	$0,75 \pm 0,09$	$0,51 \pm 0,08$	$0,16 \pm 0,04$	$0,02 \pm 0,01$
15) Кожа	$3,8 \pm 0,5$	$3,5 \pm 0,7$	$1,25 \pm 0,1$	$1,0 \pm 0,07$
16) Выведено с мочой	0,8	$2,6 \pm 0,3$	$15,7 \pm 0,2$	$20,7 \pm 0,2$
17) » » калом	—	$3,6 \pm 0,3$	$30,4 \pm 0,2$	$65,3 \pm 1,0$

Key:

- |                            |                         |
|----------------------------|-------------------------|
| 1. Object of study         | 11. Liver               |
| 2. Time of study           | 12. Kidneys             |
| 3. 6 hours                 | 13. Spleen              |
| 4. 1 day                   | 14. Lungs               |
| 5. 8 days                  | 15. Skin                |
| 6. 15 days                 | 16. Excreted with urine |
| 7. Blood                   | 17. Excreted with feces |
| 8. Muscles                 |                         |
| 9. Skeleton                |                         |
| 10. Gastrointestinal tract |                         |

We must note that the sorbent dosage of 50mg per rat, when extrapolated for man, corresponds to a dose of 1-2g per administration.

To gain an understanding of how the protective effect of ferrocin is manifested in the first hours after effect, a test was performed with balance determination of absorption and distribution of  $^{202}\text{Tl}$  5 hours after intoxication and simultaneous administration of ferrocine.

It was determined that already in the first hours after administration of the preparation there is observed a practically complete cessation of radionuclide absorption from the gastrointestinal tract. By this early period, the accumulation of  $^{202}\text{Tl}$  in the studied tissues and organs (muscles, skeleton, skin, liver, kidneys, lungs, spleen) was reduced by 92-95 percent, which is of great significance in evaluating the reduction of tissue doses.

Table 2. Comparative effectiveness of ferrocin, Antidotum Thallii Heyl and ferrocyanides in  $^{202}\text{Tl}$  intoxication (data in percentage of the control,  $M \pm m$ )

1) Препарат	2) Доза, г	3) Тотальные измерения		4) Измерения органов на 8-е сутки								
		5) 6-е сут- ки	6) 8-е сут- ки	7) печень	8) почки	9) селезенка	10) сердце	11) мышцы	12) кровь	13) скелет		
14) Ферроцин	0,0	22,9±3,9	21,9±4,3	22,6±6,9	21,0±0,9	26,7±7,4	20,8±4,8	21,8±2,8	28,0±3,7	25,5±0,6		
»	0,0	8,1±0,1	10,4±0,6	8,9±0,5	11,0±0,7	8,0±2,0	7,4±0,4	16,4±1,6	11,9±1,2	9,9±4,9		
»	0,10	6,6±0,9	7,7±0,2	6,1±0,6	7,2±0,7	8,0±0,8	3,8±0,3	9,2±1,0	6,8±0,8	7,0±1,0		
»	0,0	7,0±1,4	8,6±2,1	6,3±1,7	8,6±2,5	8,7±2,84	6,7±1,9	14,5±2,2	11,2±2,5	10,2±1,9		
15) Ферроцианид меди	0,0	12,5±1,6	17,5±1,6	12,4±1,5	8,1±0,9	9,4±1,4	6,7±1,0	11,5±1,7	10,2±1,5	19,7±2,9		
16) Ферроцианид никеля	0,0	4,7±0,9	5,4±1,0	5,3±1,0	2,2±1,0	6,2±2,8	6,9±3,3	10,7±2,0	3,4±0,7	5,1±2,5		

Key:

- |  |                         |
|--|-------------------------|
| 1. Preparation                           | 10. Heart               |
| 2. Dose, grams                           | 11. Muscles             |
| 3. Total measurements                    | 12. Blood               |
| 4. Measurements of organs on the 8th day | 13. Skeleton            |
| 5. 6th day                               | 14. Ferrocin            |
| 6. 8th day                               | 15. Copper ferrocyanide |
| 7. Liver                                 | 16. Nickel ferrocyanide |
| 8. Kidneys                               |                         |
| 9. Spleen                                |                         |

With peroral administration of  $^{202}\text{Tl}$ , the dynamics of reduction in the content of the metal in the organism as a result of excretion (control) is described by equation:

$$Q_t = 100 \cdot e^{\frac{-0,693t}{4,1}}, \quad (1)$$

where  $Q_t$  is the portion of thallium retained in the organism by time  $t$  (in days).

The isotope is excreted from the organism with half-excretion period ( $T_{\text{biol}}$ ) equal to 4.1 days. With the application of ferrocin the picture is sharply altered--there appears a rapidly excreted fraction (93.6 percent) of the radionuclide, and its excretion is described by the following equation.

$$Q_t = 93,6 \cdot e^{\frac{-0,693t}{0,6}} + 6,4 \cdot e^{\frac{-0,693t}{5,4}}, \quad (2)$$

From an analysis of the obtained data we can see that  $T_{\text{biol}}$  declines from 4.1 to 0.6 days.

To determine the effectiveness of the antidote in later periods after the metal has been deposited in the tissues and organs, a test was conducted (Table

3) with the intraperitoneal administration of  $^{202}\text{Tl}$  and a subsequent (starting on the 2nd day) course of treatment with ferrocin for a period of 2 weeks.

Table 3. Dynamics of excretion of  $^{202}\text{Tl}$  from the organism and effectiveness of one-time application of ferrocin with peroral and 2-week treatment, with intraperitoneal administration of the radionuclide.

1) Сроки после введения $^{202}\text{Tl}$ , сут	2) Пероральное введение $^{202}\text{Tl}$		3) Внутривенное введение $^{202}\text{Tl}$	
	4) контроль	5) ферроцин	4) контроль	5) ферроцин
1	80,1±1,7	30,4±5,8 (38)	81,7±1,5	81,7±1,5
2	72,3±3,5	6,0±2,4 (8,3)		Начало лечения
3	63,1±2,5	2,9±1,2 (4,6)	56,6±3,6	43,6±0,4 (77,0)
6	53,8±7,3	3,3±0,5 (6,3)	39,7±0,4	20,2±1,6 (51,0)
8	30,2±5,7	2,3±0,1 (7,6)	27,5±1,5	8,8±0,6 (32,0)
13	13,8±1,4	—	9,5±0,7	1,9±0,2 (20,0)
15	8,29±0,10	—	6,6±0,3	1,2±0,1 (18,0)

Key:

- |   |             |
|---|-------------|
| 1. Times after administration of $^{202}\text{Tl}$ , days | 4. Control  |
| 2. Peroral administration of $^{202}\text{Tl}$            | 5. Ferrocin |
| 3. Intraperitoneal administration of $^{202}\text{Tl}$    |             |

Note: The dosage of ferrocin was 0.05g per rat. Data presented represent the total measurements of the entire body, in percentages of the administered dose,  $M \pm m$  (in parentheses--percentage of the control).

As we can see from Table 3, already by the 6-8th day (with beginning of a course of treatment by ferrocin, after 2 days), the isotope content in the organism had declined to 51-32 percent, and by the 13-15th day--to 20-18 percent as compared with the control.

With parenteral administration, the rate of thallium excretion from the rat organism was practically the same as with peroral administration:

$$Q_t = 100 \cdot e^{\frac{-0,693t}{4,0}},$$

which is explained by the rapid, 100 percent, absorption of the  $^{202}\text{Tl}$  into the gastrointestinal tract. A later course of treatment with ferrocin after parenteral affliction accelerates the excretion of the isotope from the organism. In this case, the excretion curve is described by the following equation:

$$Q_t = 100 \cdot e^{\frac{-0,693t}{2,2}}. \quad (4)$$

The obtained data testify to the fact that ferrocin may be used not only for immediate first aid, preventing absorption of  $^{202}\text{Tl}$  from the gastrointestinal tract, but also as a means of treatment when the isotope has already spread throughout the organs and tissues and there is recirculation of the radionuclide in the intestinal opening.

With a prolonged course of ferrocin application, the thallium which has been isolated in the process of metabolism in the gastrointestinal tract is bonded with the sorbent and then excreted from the organism with the excrements.

In conclusion we should note that the obtained data testify to the high effectiveness of ferrocin in thallium affliction and to the possibility of recommending it for application in cases of intoxication with this metal.

#### CONCLUSIONS

1. The preparation "ferrocin," which has been approved by the USSR Ministry of Health Pharmacological Committee for medical application as a means of first aid in cases of cesium and rubidium intoxication, may be recommended as an effective antidote in cases of thallium intoxication. By its effectiveness (92-93 percent), ferrocin does not yield to the foreign preparation Antidotum Thallii Heyl.

2. With peroral application, ferrocin ensures the excretion of the metal from the internal medium of the organism as a result of preventing the reabsorption of thallium in the gastrointestinal tract.

Thus, the preparation may be recommended not only as a means of early first aid, but also as a means of excreting thallium from the organism after it has been absorbed and deposited in the tissues and organs.

3. Of the various hexacyanoferrate compounds, aside from trivalent iron salts, a high effectiveness was shown by nickel ferrocyanides. Copper ferrocyanides turned out to be less effective.

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## METHOD TO DETERMINE PLUTONIUM CONTENT IN WOUNDS

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[Article by Ye. I. Dolgirev and G. N. Kaydanovskiy, Leningrad Scientific-Research Institute on Radiation Hygiene: "A Method to Determine Plutonium Content in Wounds"]

[Text] Rapid determination of the amount of plutonium and the depth of its deposit in traumatized skin is necessary for rendering immediate first aid to victims [1]. Such determinations are important not only at the stage of preliminary examination, but also in the process of wound excision and surgical removal of the plutonium from it. The appropriate procedure of radiometric control consists, as a rule, of a series of sequential measurements: before, in the process of, and after surgical intervention. Based on the obtained measurement information, a conclusion is drawn as to the levels of the unremovable residual activity in the primary site and a prognosis of the anticipated irradiation of the patient is formulated. Ultimately this information is used as the basis for future clinical decisions.

Unfortunately, the methods of determining the content and deposit depth of plutonium in wounds described in the literature known to us [2,3] either do not meet the requirements formulated in the cited work [1] or require apparatus which is extremely complex and expensive for their realization.

In principle, the depth of deposit of radioactive material may be determined only from the relation of intensities of some two lines of photon irradiation ( $E_1 \neq E_2$ ) undergoing varying attenuation in the human soft tissues. In work [3] the depth of plutonium deposit was found from the relation of intensities of L-lines of x-ray radiation of uranium decay product with energies of 13.6, 17.2 and 20.2 keV. This was done with the aid of a cumbersome and expensive semiconductor x-ray spectrometer whose detector required constant deep cooling. Another method [2] called for the use of a standard scintillation spectrometer which was used to determine the depth of deposit from the ratio of x-ray radiation intensities with average energy of 17 keV and plutonium  $\gamma$ -radiation with energy of 53 keV. However, a significant disadvantage of this method is the fact that radiation with energy of 53 keV in practical application cannot be registered with the necessary accuracy. This is determined by the extremely low probability of gamma-photon output ( $7 \times 10^{-30}/0$ ), as well as by the presence of americium in the  $^{239}\text{Pu}$  in amounts (by activity) of



0.01 percent as a minimum (standard values 0.5-5 percent). The  $\gamma$ -radiation of  $^{241}\text{Am}$  with energy of 59.6 keV has a photon output probability of 36 percent and therefore masks the  $\gamma$ -radiation of plutonium with energy of 53 keV.

#### MATERIALS AND METHODS

The method developed in this study does not have the indicated shortcomings and allows us with the aid of readily available apparatus to effectively determine the content and depth of deposit of  $^{239}\text{Pu}$  in mixture with  $^{241}\text{Am}$  in wounds.

The intensity of photon radiation of plutonium and americium was measured with the aid of a scintillation spectrometer consisting of a detection block based on a NaI(Tl) crystal 63mm in diameter and 1mm in thickness, and an AI-256-6 amplitude analyzer.

The following expression is true for determination of plutonium content  $Q$  by the spectrometric method:

$$Q = I_{17}^{\text{Pu}} / a \cdot k^{\text{Pu}}, \quad (1)$$

where  $I_{17}^{\text{Pu}}$  is the rate of impulse count with exclusion of the background as registered by the spectrometer in the energy interval of 10-25 keV, in imp/sec;  $a = \gamma \cdot \epsilon \cdot \omega$  is the constant coefficient considering the probability of photon output  $\gamma$ , the specific effectiveness of the detector  $\epsilon$  and the geometry of the measurements  $\omega$ ;  $k^{\text{Pu}}$  is the parameter which depends on the depth of plutonium deposit in the wound. Our task consisted of obtaining a computational expression equivalent to formula (1) which would contain, instead of  $I_{17}^{\text{Pu}}$  and  $k^{\text{Pu}}$ , values which correspond to them and which are observed in the real measurements. At the same time, it was assumed that a method would be found making it possible to experimentally determine the depth of radionuclide deposit in the wound.

Based on the analysis of the real apparatus spectrum of photon radiation by the plutonium-americium mixture (Figure 1), we have:

$$I_{17}^{\text{Pu}} = I_{17}^{\text{Pu} + \text{Am}} - I_{17}^{\text{Am}}. \quad (2)$$

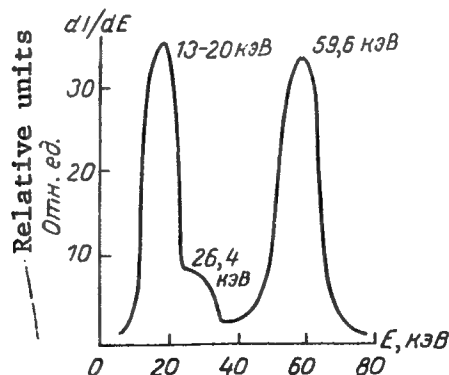


Figure 1. Real apparatus spectrum of photon radiation by plutonium-americium mixture.

Value  $I_{17}^{Pu+Am}$  represents the total count rate directly observed on the spectrometer in the energy interval of 10-25 keV (in impulses per second, determined by the x-ray radiation of plutonium ( $E = 17$  keV,  $v \approx 4\%$ ) and americium ( $E \approx 18$  keV,  $v \approx 36\%$ ), as well as by Compton dispersion photons from the gamma-lines ( $E_1 = 26.4$  keV,  $v \approx 3\%$  and  $E_2 = 59.6$  keV,  $v = 35.9\%$ ). The input into the total count rate in the energy interval of 10-25 keV determined by the x-ray and  $\gamma$ -radiation of americium  $I_{17}^{Am}$  may be determined through the experimentally observed value of  $I_{60}^{Am}$ . The latter represents the count rate in the interval of 35-70 keV, in which the photo peak of americium gamma-lines with energy of  $E = 59.6$  keV is located (see Figure 1). The corresponding expression has the following appearance:

$$I_{17}^{Am} = I_{60}^{Am} \cdot k^{Am}, \quad (3)$$

where  $k^{Am}$  is the parameter which depends on the depth of deposit of the radionuclide. With consideration of (2) and (3), the initial expression (1) may be written as follows:

$$Q = \frac{I_{17}^{Pu+Am} - I_{60}^{Am} \cdot k^{Am}}{\alpha \cdot k^{Pu}}. \quad (4)$$

Expression (4) includes the count rates of  $I_{17}^{Pu+Am}$  and  $I_{60}^{Am}$  imp/sec, directly registered by the spectrometer, as well as parameters  $k^{Pu}$  and  $k^{Am}$ , which are dependent only on the depth of deposit of the radionuclides in the wound.

The idea of finding the depth of deposit of radionuclides consisted of determining this value according to its synonymous associated relation of gamma-line intensities ( $E_1 = 26.4$  keV,  $E_2 = 59.6$  keV) is the spectrum of photon radiation of the plutonium-ameridium mixture. We selected these gamma-lines based on the fact that their probability of photon output is much higher than for other spectral lines of the defined radionuclides. Moreover, the degree of photon absorption of these lines differs significantly, which makes it possible to obtain a "strong" dependence of relation  $I_{26}/I_{60}$  on the thickness of the absorbent, and consequently also a high accuracy in determining the depth of deposit. Finally, a particularly important circumstance is that the relation of intensities of the selected lines (26.4 and 59.6 keV) does not depend on the percentage content of  $^{241}Am$  in the plutonium-ameridium mixture.

In order to realize the possibility of determining the depth of deposit with the aid of a scintillation detector, it was necessary to increase the energy selectivity of detecting radiation with energy of 26.4 keV, since part of the plutonium and americium x-ray photons, as well as part of the "escape peak" from the americium gamma-line with energy of 59.6 keV is also registered within the interval of this radiation of 15-35 keV.

We were able to achieve energy selective isolation of gamma-lines with energy of 26.4 keV by means of using special filters. Plates made of pure metals--silver and cadmium--were used for this purpose. The selection of these materials for making the filters is based on the fact that the energies of K-margins of absorption for them are similar to the energy of the line in which we are interested (26.4 keV), with the latter falling within the interval between the energies of K-margins for silver and cadmium. The thickness of the cadmium filter (0.09 mm) was selected so that the flow of photons with energy of 26.4 keV is reduced to about one-half within it. In this case, the x-ray radiation of

plutonium and americium is only 1/10 to 1/15 the initial value, while the  $\gamma$ -radiation of americium with energy of 59.6 keV is reduced by only 40 percent. The thickness of the silver filter (0.10 mm) is selected from a condition of balance so that within the entire energy sphere ranging from 10 to 60 keV, with the exception of the interval between the K-margins of silver and cadmium absorption, the photon radiation in the silver filter is weakened in exactly the same way as in the cadmium filter. Thus, the difference in detector count rates in the energy interval of 15-35 keV, recorded with cadmium and silver filters, synonymously characterizes the intensity of the gamma-lines with energy of 26.4 keV. We took the following value to characterize the depth of deposit of radionuclides in the wound:

$$\eta = (I_{26}^{\text{Cd}} - I_{26}^{\text{Ag}}) / I_{60}^{\text{Am}} \quad (5)$$

where  $I_{26}^{\text{Cd}}$  and  $I_{26}^{\text{Ag}}$  are the count rates in the interval of 15-35 keV, measured alternately with cadmium and silver filters, respectively;  $I_{60}^{\text{Am}}$  is the count rate in the interval of 35-70 keV, measured without any filters.

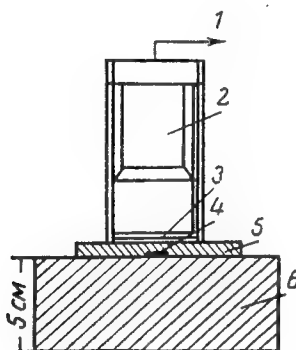


Figure 2. Scheme of radiometry of source containing  $^{239}\text{Pu}$  and  $^{241}\text{Am}$ .

1 - to impulse analyzer; 2 - FEU-92;  
3 - NaI(Tl)  $h=1$  mm; 4 - source of  $^{239}\text{Pu}$   
( $^{241}\text{Am}$ ); 5 - absorber; 6 - diffuser.

The dependences of value  $\eta$ , as well as parameters  $k^{\text{Pu}}$  and  $k^{\text{Am}}$  on the depth of deposit of the radionuclides  $d$  were obtained experimentally. The scheme of radiometry is presented in Figure 2. The source was located on a diffuser made of a tissue-equivalent material simulating the underlying surface of a wound on the human body. The layer thickness ( $d$ ) of the tissue-equivalent absorbent, which was placed above, varied within the margins of 0-30 mm. The required sources of photon radiation were prepared from solutions of nitrate of  $^{239}\text{Pu}$  and  $^{241}\text{Am}$ , which contained no noticeable admixtures of other radionuclides. The solutions were applied to the underlayers made of filter paper, dried and hermeticized with thin polyethylene film. The area of the active "spot" of each source comprised  $1 \text{ cm}^2$ . The activity of the americium source comprised  $3720 \pm 20 \text{ Bk}$  ( $\sim 0.1 \mu\text{Ci}$ ), and the plutonium-- $36,700 \pm 1700 \text{ Bk}$  ( $\sim 1 \mu\text{Ci}$ ).

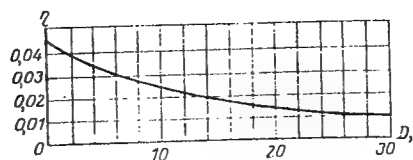


Figure 3. Dependence of value  $\eta$  on thickness of the absorbent.

The detector registered the following count rates:

$$I_{17}^{Pu}, I_{17}^{Am}, I_{60}^{Am}, I_{26}^{Cd} \text{ and } I_{26}^{Ag}.$$

The last two count rates were registered from the  $^{241}\text{Am}$  source with placement of cadmium and silver filters respectively between the absorbent and the detector. Value  $\eta$  with various absorbent thicknesses was determined by formula (5), while parameters  $k^{Pu}$  and  $k^{Am}$  were computed by formulas:

$$k^{Pu} = I_{17}^{Pu}(d)/I_{17}^{Pu}(0); \quad (6)$$

$$k^{Am} = I_{17}^{Am}(d)/I_{60}^{Am}(d),$$

where  $I(0)$  were registered without an absorbent, while  $I(d)$  were registered with an absorbent of thickness  $d$ . The dependence of value  $\eta$  on the thickness of the absorbent (depth of deposit)  $d$  is shown in Figure 3. Figure 4 presents the dependences of parameters  $k^{Pu}$  and  $k^{Am}$  not in the function of absorbent thickness, but in the function of value  $\eta$ , which may be directly obtained from the experimental data according to formula (5). The functions  $k^{Pu}(\eta)$  and  $k^{Am}(\eta)$  presented in the graphs in Figure 4 were approximated (with an accuracy of no less than 5 percent) by expressions:

$$k^{Pu} = 0,04 + 500\eta^2; \quad k^{Am} = 20\eta. \quad (7)$$

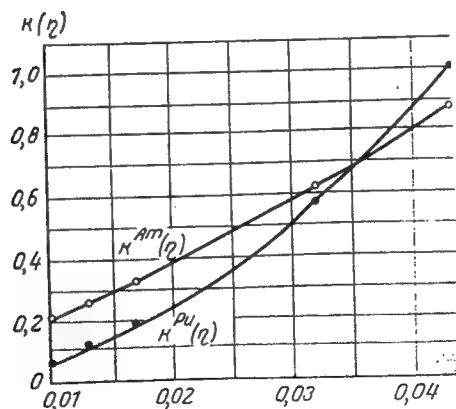


Figure 4. Dependence of parameters  $k^{Pu}$  and  $k^{Am}$  in the function of value  $\eta$ .

After substitution of expressions (7) into equation (4) and with consideration for formula (5), we obtained the desired equation for computing the plutonium content in wounds according to the data of direct measurements:

$$Q = \frac{I_{17}^{Pu+Am} - 20(I_{26}^{Cd} - I_{26}^{Ag})}{\alpha [0,04 + 500(I_{26}^{Cd} - I_{26}^{Ag})^2 / (I_{60}^{Am})^2]}, \quad (8)$$

Equation (8) includes the minimum necessary <sup>Bk</sup> and experimentally observed values, and the depth of plutonium deposit in the wound is considered automatically. At the same time, the value of deposit depth required in surgical intervention may easily be found from the graph in Figure 3.

## RESULTS AND DISCUSSION

The developed method was subjected to direct testing. A plutonium source with activity of 12,800 $\pm$ 1200 Bk (98% <sup>239</sup>Pu+2% <sup>241</sup>Am) prepared according to a technology which fully excluded getting the radioactive substance into the organism, was located on the inside of the cheek of the test subject (held by the tongue). The scintillation detector was placed against the outside of the cheek. The photon radiation was registered in three energy intervals: ( $\Delta E$ )<sub>1</sub>=10-25 keV, ( $\Delta E$ )<sub>2</sub>=15-35 keV, and ( $\Delta E$ )<sub>3</sub>=35-70 keV.

The cycle of determining the "incorporated" plutonium included three measurements. In the first, the count rates  $I_{17}^{Pu+Am}$  (10-25 keV) and  $I_{60}^{Am}$  (35-70 keV) were registered simultaneously. In the <sup>17</sup>second measurement, a cadmium filter was placed between the cheek and the detector and the count rate  $I_{26}^{Cd}$  (15-35 keV) was registered. Finally, in the third measurement a silver filter was used instead of the cadmium one and a count rate of  $I_{26}^{Ag}$  (15-35 keV) was registered. The values of the registered count rates comprised:  $I_{17}^{Pu+Am}$  = 81 imp/sec,  $I_{29}^{Am}$  = 33 imp/sec,  $I_{26}^{Cd}$  = 6.9 imp/sec and  $I_{26}^{Ag}$  = 6.0 imp/sec. <sup>17</sup> Then formula (5) was used to determine the value of parameter  $\eta$ , which turned out to be equal to  $2.73 \cdot 10^{-2}$ , and the graph in Figure 3 was used to determine the deposit depth of the radionuclides  $d=8$ mm. The directly measured thickness of the cheek also turned out to be equal to 8mm. The activity of the "incorporated" plutonium was computed according to formula (8). Here the numerical value of coefficient  $\alpha$ , which entered into the denominator of (8) for the spectrometer used in the work comprised:

$$\alpha = v \cdot \varepsilon \cdot \Omega = 0,039 \cdot 1,0 \cdot 0,3 = 1,17 \cdot 10^{-2}.$$

The value of plutonium activity computed according to formula (8) turned out to be equal to 13,000 $\pm$ 2200 Bk. Repeated measurements performed in the study of six persons ( $d=5-12$ mm) led to analogous results, and in all cases the relative error of the determinations did not exceed  $\pm 20$  percent.

Thus, the developed method provides the opportunity of effective determinations of plutonium content in wounds and depth of its deposit with the aid of simple and easy to use apparatus.

## CONCLUSIONS

1. In determining the tactics of rendering immediate first aid and in surgical intervention, actual values characterizing the depth of deposit and the amount of plutonium in traumatized skin must be used.

2. The depth of deposit of "incorporated" plutonium may be quickly and reliably determined from the relation of intensities of gamma-lines with energies of 26.4 and 59.6 keV observed in the spectrum of photon radiation of the plutonium-americiium mixture. The required energy selectivity of the scintillation spectrometer is achieved by using silver and cadmium filters placed between the opening of the detector and the studied body part of the patient.

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## COMBINED EFFECTS OF RADIATION AND CHEMICAL CARCINOGENS

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[Article by Yu. I. Moskalov and V. N. Strel'tsova: "Combined Effect of Radiation and Chemical Carcinogens"]

[Text] Man is subject to the effects of various environmental factors, many of which have carcinogenic properties. Epidemiological and experimental studies, as a rule, are devoted to the study of the effectiveness of some single factor. The combined effect of two or several potential carcinogens has attracted the attention of researchers. The effect of combined influence by various carcinogens may be synergic, additive, inhibiting, or may not be manifested.

This report is an effort to generalize the information on this question.

Of primary concern is the analysis of the carcinogenic effectiveness of combined action by blastomogenic factors with which large segments of the population come into contact in production activity or in their everyday live. Among such factors are ionizing radiation, chemical carcinogens, and among these primarily benzpyrene which pollutes the air and nitrose compounds, mineral, quartz and asbestos dust.

Overall external radiation of animals (mice) with subsequent treatment with methylcholanthrene leads to a significant increase in leukosis output as compared with the separate effect of each factor (Furth and Boon; Kawamoto et al.) The synergic effect for leukoses was obtained in experiments with irradiation of rat embryos in a one-time dosage of 1 gR on the 11th, 12th and 13th days of embryonic life, with subsequent administration of 0.5 mM/kg ethylnitroso urea to the pregnant females on the 17th day of embryogenesis (Schmal and Kriegel).

Experiments with the separate and combined incorporation of  $^{239}\text{Pu}$  dioxide (0.63 kBk, inhalation) and benzpyrene (2x5 mg intratracheally) demonstrated a significant increase in the number of tumors, with a reduction in the latent period and an increase in invasiveness of the tumors in the group with combined effect. The separate administration of plutonium and benzpyrene conditioned an insignificant tumor formation as compared with the control (Metivier et al.).

The simultaneous intratracheal administration of benzpyrene and  $^{210}\text{Po}$  ensured the effectiveness of carcinogenic action of these factors (Little et al.).

Benzpyrene (0.3 mg) and  $^{210}\text{Po}$  (0.2 kBk) were administered intratracheally every day for a period of 15 days. The sequence of effect of these factors and the rhythm of their entry into the organism was evidenced in the blastomogenic effect. Experiments conducted by the same authors with preliminary one-time intratracheal administration of 1.5 kBk  $^{210}\text{Po}$  and subsequent fractional intratracheal introduction of benzpyrene 15-18 weeks later (8 weekly injections of 0.3 mg each for a total amount of 2.4 mg) conditioned a synergic effect causing the emergence of tumors in the lungs in 17 percent of the hamsters, while the separate administration of these substances did not cause tumors.

The experiment with another  $\alpha$ -irradiator  $^{239}\text{Pu}$  and benzpyrene, like the tests with polonium and this same hydrocarbon, showed that in those cases where the effect of the chemical carcinogen precedes the radiation effect, the summation of carcinogenic effect of each factor is realized.

$^{239}\text{Pu}$  dioxide and benzpyrene were administered to rats intraperitoneally. Both carcinogens caused emergence of sarcoma of the peritoneum with separate introduction. The combined introduction of benzpyrene with subsequent inoculation of plutonium dioxide into the abdominal cavity conditioned a summation of the separate carcinogenic effects (Sanders).

A synergic blastomogenic effect was obtained in experiments with radiation and administration of procarbazine (PKP). PKP, which is used for treating lymphogranulomatosis, causes lung tumors in rats and acute myeloleukosis in primates.

PKP administered weekly in a dosage of 300 mg/kg for a period of 4 weeks causes formation of leukosis and adenoma of the lungs in mice. X-ray radiation of 0.6 gR/day for a period of 5 days did not condition the emergence of lung tumors. In the groups with combined action, the mice irradiated in the above-mentioned dosage received the above-mentioned amount of PKP 3 days or 3 weeks after the irradiation (Arseneau et al.). The animals were killed after 12 weeks. The formation of lung tumors in the groups with combined effect sharply increased this effect in mice treated with PKP.

Nitro compounds, and particularly nitric oxides, are air pollutants. They may intensify the carcinogenic effectiveness of radiation effect. The experiments conducted by N. A. Kashurnikova and M. G. Poplyko with separate and combined administration of  $^{239}\text{Pu}$  and nitric oxides into the lungs demonstrated an incidence of lung cancer which was twice as high with combined effect as compared with that of the individual effect of each factor. In these tests the rats first inhaled pentacarbonate  $^{239}\text{Pu}$  (69 kBk per 1 kg lung tissue), and then breathed nitric oxide (0.09 mg/l) for a period of 15 minutes.

The combined effect of dust of various composition and ionizing radiation takes place in mines, electrical stations, metallurgical enterprises, and at various assembly jobs. We know that many types of dust are carcinogenic. The effect of radiation is also carcinogenic. A study of the combined effect of these factors demonstrates the possibility of synergic effect.

With separate and combined intratracheal administration of 38 kBk of  $^{210}\text{Po}$  and 50 mg quartz dust suspension in physiological solution to each rat, a



clear increase in the frequency of malignant tumors of the respiratory passages was obtained for the group with combined effect (Panov et al.).

The prolonged inhalation (up to 1 year) of mineral dust containing highly active thorium oxides led to the development of chronic pneumonia and fibrosis of the lungs. Several rats developed lung tumors (Ponomareva et al.). The combination of this effect with chronic total irradiation of the rats with  $\gamma$ -rays in a dose of 20 mgR/day to a total dosage of 2.5 gR doubled the occurrence of lung cancer as compared with that found in groups of animals inhaling the dust concentrate or subjected to external radiation.

Synergic interaction of radiation and dust carcinogens was obtained by Lafuma et al. in tests with the inhalation of radon and intrapleural administration of chrysolite asbestos. For a period of 1 month, 8 rats inhaled 8000 RUM  $^{222}\text{Rn}$ , and 70 days after completion of the inoculation they were administered 2 mg chrysolite asbestos intrapleurally. In the rats inhaling the same amounts of radon, lung cancer was found in isolated cases. Asbestos did not cause lung tumors, but facilitated the formation of a few mesotheliomas. Lung cancer was found in 100 percent (8 out of 8) and mesotheliomas--in 87.5 percent (7 out of 8) rats subjected to the combined effect of radon and dust.

The model experiments conducted by V. A. Knizhnikov et al. with intratracheal administration of shale ash to mice, ash with benzpyrene, ash, benzpyrene and  $^{210}\text{Po}$  also demonstrated the synergic carcinogenic effect of the triple interaction.

In triple combination, the occurrence of lung tumors increased from 35 percent (ash) to 61 percent (triple combination), while the latent period was reduced from 300 to 200 days.

The combined action of radiation and dust carcinogens does not always give a synergic effect. Sanders observed a reduction in the occurrence of lung cancer in rats that had been intratracheally administered chrysolite asbestos fibers and plutonium dioxide. In these experiments, in the "asbestos" group lung cancer comprised 4.5 percent, in rats receiving  $^{239}\text{Pu}$ --32 percent, and in animals with combined effect--21 percent. The inhibition of the carcinogenic action of plutonium in the described cases is evidently associated with the high mortality of cells which could have become cancerous, since the lungs of the rats received a triple dose (12 gR--group with combined effect, 4 gR--"plutonium" group) with the combined effect.

With the combined effect there was observed a high retention of  $^{239}\text{Pu}$  in the lungs. The  $T_{1/2}$  for pure plutonium comprised 200 days, while for plutonium in combination with asbestos--400 days.

The action of radiation and tobacco smoke gives a synergic carcinogenic effect. An analysis of the frequency of lung cancer among smokers and non-smokers demonstrated a ten-time increase in this pathology among uranium mine workers who smoked (Hanszel et al.). Cigarette smoking acts as a promoting agent in regard to the development of lung cancer, reducing the latent period (Table 1).

Table 1. Number of deaths from cancer of the respiratory passages among uranium mine workers in relation to smoking (according to NKDAR [not further expanded] data)

Relation to smoking	Risk man-years (ChLR)	Cancer of the respiratory passageways		O/E	$\frac{O-E}{ChLR}$
		Observed (O)	Expected (E)		
Smokers	26,392	60	15.5	3.9	$17 \cdot 10^{-4}$
Non-smokers	9,047	2	0.5	4.0	$1.7 \cdot 10^{-4}$

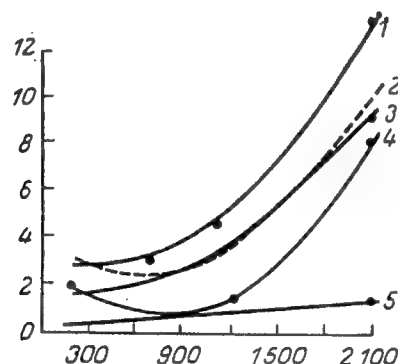


Figure 1. Mortality from cancer of the respiratory passageways in different categories of miners-smokers subjected to the effect of radon and its decay products (according to NKDAR).  
 1 - over 20 cigarettes per day; 2 - former smokers; 3 - 20 cigarettes per day; 4 - from 1 to 19 cigarettes per day; 5 - non-smokers.  
 Along the abscissa axis--number of monthly work levels; along the ordinate axis--mortality from cancer of the respiratory passageways (1,000 man-years).

Figure 1 demonstrates a clear dependence between the frequency of lung cancer in miners subjected to the effects of radon and the number of cigarettes smoked per day.

Hormonal factors play a large role in the genesis of tumors induced by ionizing radiation. Under conditions of normal functioning of the endocrine system

with physiological level and rhythm of secretion of various hormones and their physiological relation in the organism, the endocrine glands are one of the components of the organism's antitlastic system. Under conditions of dyshormonosis they become a factor stimulating carcinogenesis.

A synergic effect was obtained for a number of radiation-induced tumors with the combined effect of radiation and hormonal factors.

The probability of development of tumors of the osteal tissue generated by incorporated radionuclides depends to a certain degree on the hormonal regulation of the osteogenic processes. The disruption of this regulation may facilitate the development of radiation osteosarcoma and inhibit it. It turned out that the frequency of inducement of radionuclide osteosarcomas depends on the activity of the endocrine glands, which affect the mineral metabolism, and primarily on the state of the parathyroid glands.

It has been shown (A. I. Dobroskok et al.) that the administration of parathyrocrin (daily for 5, 22, 40 days from 0.5 to 3 ml hormone with activity of 20 AU in ml) to rats who are carriers of osteosarcomogenic amounts of  $^{45}\text{Ca}$  increases the frequency of occurrence of low-differentiation malignant tumors of the bone tissue by 3.4 times (Table 2).

Table 2. Effect of parathyroid gland dysfunction on radiation osteoblastomogenesis in rats (according to data of A. I. Dobroskok et al.).

Experiment variant	Bio-control	$^{45}\text{Ca}$	$^{45}\text{Ca}$ + parathyrocrin	$^{45}\text{Ca}$ + parathyroid-ectomy	Parathyrocrin
Dose in skeleton, gR	0	3.0	4.0	5.1	0
Osteosarcomas	0	10/63 (16 $\pm$ 4.6)	29/63 (38 $\pm$ 6.1)	1/21 (4.8 $\pm$ 4.8)	0
Latent period, days	0	220-250	220-250	370	0
Type of differentiation	0	Non-differentiated 20%  Differentiated 80%	Non-differentiated 62.5%  Differentiated 37.5%	Differentiated	0

Note: In the numerator--number of rats with tumors, in the denominator--number of test rats. In parentheses--data in percentages.

According to the data of Nielsen and Bounback, the introduction of estrogen hormones stimulates osteosarcomogenesis. In male and female mice of the SVA strain who had received estrogens for a prolonged period after the administration of  $^{90}\text{Sr}$ , the development of these tumors was accelerated by 120 days and the number of tumors formed was doubled. The authors associate this effect with the capacity of estrogen hormones to intensify the apposition of endosteum and to activate the transformation of reticular cells of the bone marrow into primitive cell-fiber connective tissue.

Materials have been obtained which indicate the possibility of suppressing the induction of osteosarcoma by means of altering the endocrinal status in the rats--the carriers of osteosarcomogenic amounts of osteotrophic radionuclides. The materials of A. I. Dobroskok et al., V. L. Shvedov and V. P. Semenov, and V. L. Shvedov et al. demonstrate the inhibition of radionuclide osteosarcomogenesis in animals that had undergone parathyroidectomy (Table 3).

Table 3. Endocrinal modification of osteosarcomogenesis (according to the data of V. L. Shvedov and V. P. Semenova)

Test variant	No of rats in test	Latent period, days	No of rats with osteosarcomas	
			abs.	%
$^{90}\text{Sr}$ , 10.1 kBk/g $^{-1}$	98	185	69	70.4 $\pm$ 5.0
$^{90}\text{Sr}$ + removal of thyroid gland	98	143	60	61.2 $\pm$ 4.0
thyroid parathyroid gland	100	160	35	35.0 $\pm$ 5.0
parathyroid gland	97	210	22	22.6 $\pm$ 4.0
$^{131}\text{I}$ (18.5 MBk per rat) $^{90}\text{Sr}$ (10.1kBk/g)	207	230	2	0.96 $\pm$ 0.5

As a result of the removal of the parathyroid gland, the frequency and rate of osteosarcomas induced by  $^{45}\text{Ca}$  was only 10/33 the previous number (from 16 to 4.8 percent) (see Table 2). The frequency of formation of these tumors under the influence of  $^{90}\text{Sr}$  (see Table 3) was reduced to only 1/3. Simultaneous removal of the thyroid and parathyroid glands conditioned a reduction in the frequency of strontium osteosarcomas to only 1/2 the previous number.

Radiothyroidectomy gave the maximal effect. As a result of its application, the frequency of strontium osteosarcomas was only 1/73 the previous number (from 70.4 to 0.96 percent), and the forms of tumors emerging were most differentiated.

The materials presented above demonstrate the complexity of the relation of radiation and hormonal factors in radiation osteosarcomogenesis. An excess of parathyroid hormones, having a synergic effect, stimulates the growth of radionuclide osteosarcomogenesis. A sharp reduction in its level achieved by various methods has the reverse effect.

Changes in the hormonal status of man and animals have a significant effect on the induction of radiation tumors of the mammary glands, intensifying their formation.

Yu. N. Pavlenko-Mikhaylov showed that in female rats receiving total one-time radiation with  $\gamma$ -rays of  $^{60}\text{Co}$  in a dosage of 2 gR, the emergence of mammary gland tumors is preceded by the progressive formation of follicular ovarian cysts intensively producing estrogen hormones, as well as by luteinization of the stroma, forming non-classical phenolsteroids. These factors together stimulate the proliferation activity of the mammary gland (V. M. Dil'man, 1968, 1976). The curves showing increase in frequency of follicular cysts and tumors of the mammary gland are identical (Figure 2).

The experiments conducted by Segaloff and Maxfield, Shellabarger et al. demonstrated the synergic effect of radiation and exogenic estrogen hormones in the formation of mammary gland tumors (Table 4). This effect was obtained in experiments with irradiation of rats of the AxC strain with x-rays and neutrons, and was absent with the combined effect of neutron radiation and administration of the same estrogens in rats of the Sprague-Dawley strain (see Table 4).

Ye. A. Ird, who irradiated male and female rats one time with a total dose of  $^{60}\text{Co}$   $\gamma$ -rays in the amount of 3.5 gR, did not obtain synergism in the effect of the radiation and exogenous estrogens in the induction of mammary gland tumors. The combined effect of these factors, while not increasing the frequency of neoplasms of the mammary glands, significantly accelerated their formation (see Table 4).

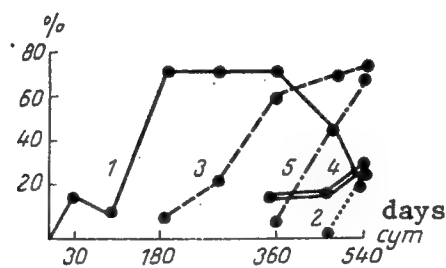


Figure 2. Cumulative frequency of tumors of the mammary glands, hypophysis, and follicular ovarian cysts in female rats irradiated at sexual maturity with  $\gamma$ -rays  $^{60}\text{Co}$  in a dose of 2 gR (according to Yu. N. Pavlenko-Mikhaylov).  
1 and 2 - follicular ovarian cysts in irradiated and control rats, respectively; 3 and 4 - tumors of the mammary glands in irradiated and control rats, respectively; 5 - tumors of the hypophysis in irradiated rats.

Table 4. Frequency of mammary gland tumor formation with separate and combined effect of radiation, estrogens, and prolactin

Radiation		Estrogen		Type of animals	Time of appearance of first tumor	Frequency of mammary gland tumors, %	Authors
Type	Dose, GR	Type	Dose				
0	0	0	0	8-wk old rats of the AxC strain, females	0	0	Segaloff and Maxfield
X-ray radiation							
left mammary	8.0	0	0	Same	80 weeks	1.1	Same
gland network	0	DES	5 mg intra-scapular	"	33	1.7	"
X-ray radiation							
left mammary	8.0	DES	same	"	26	5.6	Interaction coefficient 2.0
gland network	0.096	0	0	Rats of the AxC strain, females	--	3 tumors in 33 rats	Shellabarger et al.
Neutrons 0.43 MeV	0	DES	--	"	--	182 tumors in 25 rats	Same
0	0.096	DES	--	"	--	842 tumors in 35 rats	"
Neutrons 0.43 MeV	0.096	DES	--	Rats of the Sprague-Dawley strain, females	--	2 tumors in 31 rats	Interaction coefficient 3 for AxC rats
Same	0.096	DES	--	"	--	11 tumors in 31 rats	Jokoro et al., 1977
"	0.096	0	--	Same	--	2 tumors (fibro-adenomas) in 27 rats	
X-rays	2.0	0	0	W/Fu rats, females	6 months	Tumors in 60% of the rats, primarily adenocarcinomas	
"	2.0	Pro-lactin	Inoculated mammo-tropic hypophysis	Same			
0	0	"	tumors	"		0	
Fission neutrons (E <sub>cp</sub> 2 mg)	0.2	0	Same	"		2	Jokoro et al., 1980
Same	0.2	"	Mammo-tropic hypophysis tumors inoculated after irradiation	"		42	Same

Table 4. (continued)

Radiation Type	Dose, gR		Estrogen		Type of animals	Time of appearance of first tumor	Frequency of mammary gland tumors, %	Authors
	Type	Dose	Type	Dose				
0		0	0	0	Hybrid rats, female	611-38*	25	Jokoro et al., 1980 Ye. A. Ird
General - radiation $^{127}\text{Cs}$		3.5	0	0	Same	443-12*	74	
0		0	Estradiol benzoate	20 g daily for 10 days	"	500-25*	33	
General - radiation $^{127}\text{Cs}$		3.5	Same	Same	"	416-18*	55	
Same 0		3.5 0	0 Estradiol benzoate	0 20 g daily for 10 days	Male rats Same	0 --	12 5	
$\gamma$ -Rays $^{137}\text{Cs}$		3.5	Same	Same	"	Reduction of latent period	5	
0		0	0	0	"	0	0	

\* Indicates average latent period (in days).

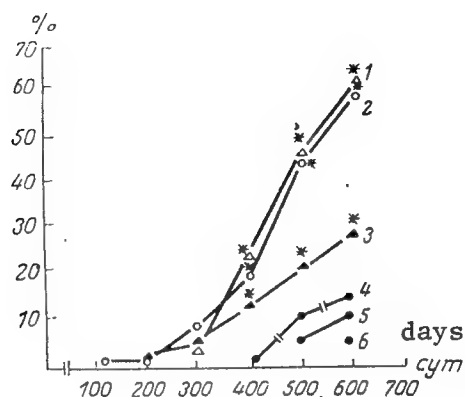


Figure 3. Cumulative frequency (in percentages) and time of emergence of leukoses and tumors of the mammary glands and hypophysis in female rats irradiated during the period of embryogenesis with  $\gamma$ -rays  $^{60}\text{Co}$  in a dose of 1 gR. 1 - tumors of the hypophysis; 2 - tumors of the mammary glands; 3 - leukosis; 4 - biological control, tumors of the hypophysis; 5 - biological control, tumors of the mammary glands; 6 - biological control, leukosis.

Nilsson et al. pointed out the synergism of blastomogenic effect of incorporated  $^{90}\text{Sr}$  and exogenic estrogen hormones. The incorporation of 0.925, 1.850, 7.400 KBk/g  $^{90}\text{Sr}$  on the average induced tumors of the hypophysis in 2 percent of the animals. The administration of polyestradiol and methylprednisolone to intact mice facilitated an earlier formation of these tumors in 10 percent of the mice. The combined effect of 0.925; 1.850 KBk/g  $^{90}\text{Sr}$  and hormones ensured an even earlier formation of tumors of the hypophysis in 44 and 37 percent of the mice, respectively.

It is possible that the synergic blastomogenic effect with combined action of endogenous or exogenous estrogens is associated with the increased prolactin secretion in such animals. The tests conducted by Shellabarger et al. showed that all rats of the AxC strain exhibiting an increase in the occurrence of mammary gland tumors with combined effect of radiation and estrogens also exhibited mammatrophic prolactin-secreting tumors of the hypophysis.

The experiments conducted by V. N. Strel'tsova et al. demonstrated the fact of a clear increase in the frequency of mammary gland tumors, leukosis, tumors of the adrenal glands and other organs, and in the total number of tumors in rats irradiated during the period of embryogenesis, during suckling age, in the sexually mature state, and from the moment of neoplastic transformation of the hypophysis in these animals (Figure 3). The formation of tumors of the hypophysis not only sharply increased the frequency of mammary gland tumors in the irradiated rats, but also stimulated their malignancy.



The follicle stimulating hormone of the hypophysis has a proliferative effect on the development of the ducts and alveoli in the mammary glands. The mammotrophic hormone of the hypophysis (prolactin) acts only on the gland undergoing definite development (V. M. Dil'man, 1976). As a result of the experimental increase in the level of prolactin, there is an increase in the frequency and an acceleration in the development of cancer of the mammary glands (N. V. Yel'tsina). Jokoro et al. (1977), who inoculated mammotrophic tumors of the hypophysis as a prolactin supplier to irradiated and intact rats, obtained a synergic effect (see Table 4).

X-ray radiation in a dose of 2 gr caused tumors of the mammary glands in 7.4 percent of female rats of the W/Fu strain (2 tumors in 27 animals; see Table 4). The administration of prolactin did not lead to the occurrence of mammary gland tumors in intact females of this strain, while the irradiation of the rats in the same dosage in combination with prolactin conditioned the development of mammary gland neoplasms in 60 percent of the females. An analogous effect was obtained with the combined action of irradiation by fission neutrons and prolactin (Jokoro et al., 1980; see Table 4).

The reduction of prolactin secretion by pharmacological agents hinders the occurrence of tumors of the mammary glands, increases the latent period of their appearance, and reduces the rate of growth of these tumors in the organism. Phenothiaside derivatives, reserpine and tricyclic antidepressants, blocking the synthesis or liberation of the prolactin-inhibiting factor of the hypothalamus, increase the secretion of prolactin and facilitate an increase in the rate of cancer of the mammary glands (NKDAR).

The synergic blastomogenic effect of the combined action of radiation and hormones, particularly estrogen hormones and hormones of the hypophysis, is associated with the fact that the hormones provide proliferatogenic stimulation of the dormant tumor cells induced by radiation.

I. Berenblyum formulated a concept of the two-stage character of carcinogenesis: initiation or emergence of the tumor cell, and proliferation. Progression, according to the concept of Foulds, is the process of further development of the tumor through qualitatively different stages, which presume inherited changes of an irreversible character of one or several clearly manifested indicators.

The mechanism of initiation of tumor cells under the influence of radiation is complex and unclear. Undoubtedly, the formation of tumoral cells is associated with the direct effect of radiation on the chromosomal apparatus of the nucleus (V. N. Strel'tsova and Yu. I. Moskalev). The role of mediated influences, and primarily dyshormonal states, is significant in the induction and progression of a number of radiation-induced tumors (V. N. Strel'tsova). Undoubtedly, the damage to the mitochondria with inactivation of numerous components of the enzyme oxidation-reduction chain is important in the genesis of radiation-induced tumors.

The basis for the synergic effect of radiation in combination with chemical, hormonal and other carcinogenic factors is the ability of radiation to induce

large numbers of tumoral cells, which may be retained for a long time in a latent state and activated under the influence of an additional stimulating factor. The experiments conducted by Hoshino et al. with preliminary irradiation of the skin with  $\beta$ -rays of  $^{90}\text{Sr}$ - $^{90}\text{G}$  and its subsequent treatment with 4-nitroquinoline-1-oxide (4NQO) showed a 10-time increase in the formation of skin tumors with combined effect when this substance was applied to the skin 11 days, as well as 408 days after the effect of the  $\beta$ -particles. These materials testify to the fact that tumoral cells induced by  $\beta$ -radiation are retained intact in the skin for a long period, and with application of a new proliferative stimulus (the effect of the 4NQO) they begin to grow and form tumors which are excessive as compared with one-time effect.

The research by L. A. Andrianov and V. S. Turusov and of V. S. Turusov showed that a definite role in the generalization of oncogenesis with combined effect of radiation and chemical carcinogens belongs to the duration of retention of the chemical carcinogen in the irradiated tissue.

The proliferatogenic factor stimulating radiation oncogenesis may not possess carcinogenic properties. The experiments conducted by Little et al. demonstrated that this effect may also be caused by a physiological solution administered after one-time injection of 1.6 KBq  $^{210}\text{Po}$ . In this case, the activation of the carcinogenic effect of  $^{210}\text{Po}$  was conditioned by a non-specific inducer of cell proliferation, which according to histographic data, triggered a wave of mitoses in the lungs of the test hamsters.

Cell proliferation is a mandatory precondition for the neoplastic transformation of tissue (V. S. Shapot). The proliferative stimuli, touching upon the dormant tumoral cells induced by the radiation, intensify the progression of the tumor.

The experiments performed by Queval and Beanmantin demonstrated that chemical carcinogens (methylcholanthrene, benzpyrene, benzflavon) intensively stimulate the induction of respiratory enzymes into the tissues which they affect. An increase in enzyme synthesis is accompanied by a reduction in the latent period of tumors formed under the influence of these carcinogens and radiation. This testifies to a connection between the carcinogenic properties of the substance and its capacity for stimulating the synthesis of the respiratory enzymes in the tissues.

The mechanism of biological, including also blastogenic, action of the hypophyseal and estrogenous hormones is associated with the stimulation of adenylyl cyclase synthesis and the formation of cyclic adenosinemonophosphate (a component of the cell energy cycle associated with the system of respiratory enzymes and phosphorylation), as well as with the synthesis of individual informational RNA which ensure protein biosynthesis (D. Kh. Khamidov et al.; A. Ya. Olina and G. Ya. Vitola).

The cell targets of the thyroid gland hormones (thyroxin, triiodothyronine) are the mitochondrial enzyme systems of oxidation phosphorylation (A. I. Galgel'gans et al.).

The materials presented above demonstrate the fact of unidirectionality in changes of the enzyme systems, particularly the isoenzymes of the respiratory cycle and oxidation phosphorylation, in the process of oncogenesis determined by radiation, chemical, hormonal or other carcinogens. These factors undoubtedly play a significant role in the synergetic effect of the combined action of radiation and other carcinogens.

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ALL-UNION SCHOOL 'ULTRASOUND DIAGNOSTIC EQUIPMENT AND ITS CLINICAL APPLICATION'

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian No 9, Sep 84, pp 91-93

[Article by V. K. Frolov and L. V. Babin: "All-Union School 'Ultrasound Diagnostic Equipment and its Clinical Application'"]

[Text] The All-Union School for Leading Experience in the Application of Ultrasound Diagnostic Equipment (UZDA) in Medicine was held on 19-23 October 1983 in Moscow at the USSR VDNKh [Exhibit of USSR National Economic Achievements] Public Health Pavilion. The goal of this school was to familiarize specialists with the current state of developments in the sphere of UZDA and with the basic aspects of its clinical application.

One hundred fifty specialists from Moscow and other cities took part in the work of this school. Approximately 50 papers dealing with various questions of technical development and clinical application of ultrasound in the most varied spheres of medicine were presented and discussed.

In his review lecture, USSR Ministry of Health All-Union Scientific-Research Institute on Medical Technology Director R. I. Utyamyshev presented the basic directions and tendencies in the development of UZDA, which is a rapidly developing form of technology. Specifically, world expenditures for its manufacture are presently increasing by over 30 percent annually. Being one of the top priority types of technology reflecting the latest achievements in scientific-technical progress, UZDA makes it possible to achieve a high effect in diagnostic work. It is characterized by a high degree of information in examination and good economic indicators (low material and energy expenditure, lower, for example, than the cost of x-ray technology with comparable diagnostic capacities). At the present time throughout the world there is a stable tendency toward an increased volume of manufactured UZDA and toward the expansion of its nomenclature. Instruments at all levels of complexity are being manufactured, including those accessible to small medical institutions. It is important to note that at the present time, in the opinion of foreign experts, the portion of ultrasound diagnostics comprises around one-half the volume of all studies in functional diagnostics, and this portion is constantly increasing. Another characteristic feature is also the continuous expansion of the spheres of application and methods of ultrasound diagnosis. There are now such new classes of instruments as scanners of the small organs, instruments for studying the vascular system, and ultrasound reconstructive tomographs which make it possible to perform fine differentiation of soft

tissue formations, primarily neoplasms of the mammary gland. Instruments operating on a real time scale are becoming most widespread. From the standpoint of technological design, the promising UZDA are primarily those with digital devices with built-in or autonomous means of computation which control the work of the system as a whole as well as perform quantitative processing of the given diagnostic parameters.

No more than 10 years have passed from the moment when mass production of UZDA was begun in the world. However, in this time there has been a gigantic qualitative and quantitative leap. In essence, an independent branch of technology has been formed for functional and structural diagnostics. It has become a determinant and even a leading force in the series of clinical disciplines (cardiology, obstetrics and gynecology, surgery, oncology, etc.). This high degree of universality of ultrasound methods is defined by its unique properties of using acoustic (ultrasound) irradiation for diagnosis and favorably distinguishing it from other types of penetrating radiation. Specifically:

- its high penetrating capacity combined with relative harmlessness, painlessness, non-invasive character of action, and absence of ionizing action and cumulative effect;

- the high sensitivity of irradiation to changes in the physical and physiological characteristics of the sounded biological tissues, providing high contrast in the representation of media which are similar in their acoustic parameters;

- its ability to detect, localize and visualize mobile structures.

All the above-mentioned qualities make it possible to use ultrasound methods of diagnosis for solving not only the specific problems of clinical and experimental medicine, but also for resolving the vital social task facing public health--changing over to general annual check-ups for the population.

The basic tendencies and directions in the development of UZDA have also been reflected in the development of domestic equipment. In the speech presented by L. V. Babin (All-Union NIII on Medical Technology) devoted to the state of the art in our country, it was noted that a peculiarity [of these developments] is the application of unified technical decisions and the creation of base systems of visualization which will be manufactured in different variants and will have great diagnostic and service capacities at various levels of medical application. According to the predictions of specialists, in the next 2-3 years a number of designs developed by specialists from Gorky, Vilnius and Leningrad (specifically, echocardiscopes with micro-processor control and digital memory, scanners for abdominal examinations with manual and automatic scanning, etc.) will provide for the country's needs in terms of instruments of this class. This will make it possible to take outdated models out of production.

In evaluating the state of development and production of UZDA in our country, we must note that the technical level of designs produced by various ministries and departments is not always satisfactory and sometimes quite varied, while

the volume of products already being manufactured does not cover the existing needs. Moreover, the times of putting products into series production are often too lengthy. This also does not facilitate the successful introduction of ultrasound methods of diagnosis into the practical application of public health.

A number of reports (G. I. Il'yukevich et al.; K. Yu. Syaurusaytis et al.; V. A. Starikov et al.; E. L. Piletskas et al.) dealt with the technical questions of creating an automatic echocardioscope with digital memory and microprocessor, static and dynamic echotomoscopes with digital processing, and the development of a multi-purpose echotomoscope with microprocessor and digital signal processing.

The most varied aspects of diagnostic application of ultrasound were reflected in the rather extensive clinical portion of the school. A number of speeches dealt with using ultrasound methods in surgery. Surgery is a synthetic sphere of application of UZDA, which is being successfully used at all stages of examination and treatment of the patient: before the operation--for obtaining diagnostic information on the organ in question (its dimensions), its location in relation to the other organs, the character of the pathology, etc., which ultimately makes it possible to clarify the plan of performing the operation; during the operation and for express-diagnosis in resolving questions arising in the course of the operation; and also in the post-operative period--for evaluating the immediate and long-term consequences of the surgical intervention, the course of recovery, and the rehabilitation of the patient. Ultrasound methods of diagnosis are particularly valuable in acute forms of illnesses, traumas, and in field medicine. The high degree of informativeness of ultrasound study methods in emergency surgery is illustrated in the report by E. Ya. Dubrov (Moscow). Questions of practical application of various ultrasound diagnostic equipment for inter-operative diagnosis of foreign bodies in the brain and in the diagnosis of gunshot wounds and their complications are reflected in speeches by A. I. Deryabin and D. I. Tsurupa (Kuybyshev). The high methodological level of performing ultrasound diagnostic studies in identifying focal afflictions of the brain is demonstrated by L. B. Likhтерman et al. (Gorky).

Ultrasound diagnosis has become most widespread in cardiology. This is determined by the unique properties of ultrasound radiation and the significance of the obtained diagnostic information. With the aid of UZDA it is possible to record and observe the mechanical functions of the heart and the major vessels, which in addition to the standard EKG methods gives a reliable picture of the state of the heart on the whole in the norm as well as in pathology. Ultrasound diagnostics in cardiology stands out as a most important means of differential diagnostics. UZDA operating in the real time frame has become most widespread in cardiology. Among such devices are echocardiographs with M-mode of echo-signal treatment, secretory and, less often, linear scanners. All these directions were reflected in the reports presented by Ye. F. Lukushkina et al. (Gorky), D. G. Lazyuk and S. I. Kuskov (Minsk), A. I. Shatikhin (Moscow), E. D. Brakovich and L. A. Yefimov (Rostov), and B. Ya. Mints et al. (Gorky).



Of great scientific interest and definite practical significance were the reports on the application of UZDA in obstetrics and gynecology for monitoring the course of pregnancy--given by I. V. Zaytsev and A. M. Stygar (Moscow), O. I. Vinnitskiy (Lvov), S. U. Mustafayev and Zh. Sh. Isaliyev (Alma-Ata); for detecting defects in fetal development--given by S. L. Karpov (Moscow); and for detecting tumors of the female organs--given by B. I. Zykin and S. M. Voyevodina (Moscow). Aside from the great diagnostic effect, the introduction of UZDA into obstetrics also has great social significance. In a comparative evaluation of the various methods of prenatal diagnosis, the unquestionable advantages of ultrasound methods have been determined, both from the standpoint of volume of obtained diagnostic information as well as in terms of the possibility of application of these methods for screening purposes in performing mass prophylactic examinations of pregnant women (M. A. Fuks, Moscow; I. V. Zaytseva and A. M. Stygar, Moscow).

A considerable portion of the reports was devoted to the application of UZDA in oncology. According to these materials, the following characteristic peculiarities of ultrasound diagnostics in oncological practice may be noted:

1. Ultrasound studies have no contraindications for application and encompass a large number of organs of various localization.
2. The experience of UZDA application has shown the presence of clearly expressed typical indications of oncological illnesses of the soft-tissue organs, which predetermines the possibility of using this method as the basic one, without necessarily performing x-ray studies, as for example in the diagnosis of oncological illnesses of the parenchymatose organs of the abdominal cavity and the retroperitoneal space, the internal secretion glands, etc.
3. Scanners for manual and linear scanning have become most widespread in oncology. These provide good field of vision, which is important in determining the mutual location (syntopy) of organs and tumors and give good reference to the characteristic anatomical structures, as for example the bones. Instruments operating in the real time frame are most widely used in oncology.
4. At the present time, the development and introduction of comprehensive diagnostic programs is expedient in oncology. These programs include ultrasound, television, x-ray, radionuclide diagnosis and computer tomography. However, a real necessity is the determination of the place and sequence of application of each of the methods, depending on the specific clinical situation. From this standpoint, the report by G. A. Zubovskiy et al. (Moscow) presented the greatest interest. It demonstrated convincingly the necessity and the effectiveness of such a comprehensive approach, in which the best aspects of various methods of study are used most fully and rationally. An interesting report concerning the significance of experience gained by the researcher in obtaining and interpreting diagnostic information was presented by V. N. Demidov et al. (Moscow).

A number of reports dealt with the application of UZDA in pediatrics (I. V. Dvoryakovskiy et al., Moscow; V. V. Safronov et al., Gorky), in rheumatology (P. A. Chigayte and A. A. Matulis, A. Yu. Budonis et al., Vilnius), and in

ophthalmology (Yu. K. Shirshikov and A. A. Chernenko, Moscow); A. I. Paunksis et al., Kaunas). The report by G. I. Eneniy et al. (Riga) on the development and clinical testing of a domestic gel-contact medium for ultrasound studies was important from a practical standpoint. A report on a totally new direction in clinical application of focused ultrasound for activation of certain structures was presented by V. I. Antipov et al. (Leningrad). The reports by Yu. S. Vazhmyy et al. (Moscow) and V. V. Men'shikov et al. (Leningrad) were devoted to questions of clinical application of ultrasound doppler apparatus.

On the whole, the results of the school showed that ultrasound diagnosis is becoming ever more widespread in various spheres of clinical and experimental medicine. However, the insufficient technical provision as well as a number of unresolved organizational questions also have an effect on the successful development of this sector of diagnostics. Up to the present time, the application of ultrasound diagnostics is not regulated by documentation within the system of the USSR Ministry of Health. The structure of diagnostic subdivisions (offices) has not been defined, and there is no statute on the physician-specialist in ultrasound diagnostics. A current question is that of defining the head medical organizations whose functions would include questions of developing and improving ultrasound diagnosis methods, defining their place in diagnostic complexes, and working out normative and methodological documentation.

The effective solution of these questions will undoubtedly facilitate the successful introduction of these highly informative, safe, and economically profitable methods of diagnosis into the practice of public health.

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CSO: 1840/1008

MEETING OF COORDINATING COUNCIL OF ALL-UNION INTERDEPARTMENTAL MODIFICATOR PROGRAM

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian No 9, Sep 84 pp 93-94

[Article by A. N. Dedenkov, I. G. Zhakov and V. G. Ovchinnikova: "Meeting of the All-Union Interdepartmental 'Modificator' Program" Coordinating Council"]

[Text] The meeting of the Coordinating Council of the All-Union Interdepartmental "Modificator" Program was held on 8-9 December 1983 in Minsk and based at the BSSR Ministry of Health Belorussian Scientific-Research Institute of Oncology and Medical Radiology. The meeting was devoted to the analysis of experimental and clinical results on hyperthermia--one of the research directions of this program.

BSSR Minister of Health and BSSR Academy of Sciences Academician N. Ye. Savchenko opened the meeting. He stressed that studies on the clinical application of hyperthermia and hyperglycemia were begun at the Belorussian Scientific-Research Institute of Oncology and Medical Radiology under the BSSR Ministry of Health at the initiative of Professor N. N. Aleksandrov. In the period of over 10 years during which the institute has been engaged in this work, important results have been obtained on the application of hyperthermia and hyperglycemia in radiation, pharmaceutical and comprehensive treatment of patients with malignant neoplasms.

A. N. Dedenko (Obninsk), deputy chairman of the USSR Academy of Sciences Scientific Council on X-Ray Studies and Radiology and doctor of medical sciences, noted that the studies performed along this direction of the program have entered a new phase of development requiring clear coordination of work by the 16 institutions throughout the country for the fastest possible introduction of the new methods of thermoradiotherapy into the broad practical application of domestic public health. Original equipment for localized and general microwave hyperthermia have been developed and are currently being produced in our country. A method of short-term hyperglycemia has been created. Extensive experimental work is being performed on the optimal schemes for thermoradio- and thermochemotherapy. Clinical tests have begun on the most effective methods of treating resistant forms of malignant tumors. In connection with this, we must closely analyze the experience which has been accumulated and outline the directions for further experimental and clinical work.

There were 112 participants in the conference from 16 institutions, including the curators of the program's four main directions. There were three conference sessions. At the first session, Doctor of Biological Sciences A. K. Konoplyannikov (Obninsk), curator of experimental work in this direction, presented a review lecture. In his presentation, he analyzed the results of a 1983 study on the molecular cell and tissue mechanisms in the radiosensitizing and harmful effect of hyperthermia and hyperglycemia. He focused specifically on the data on the effect of hyperthermia in DNA synthesis, on the heat sensitivity of truncanal and clonogenic cells of normal and tumoral tissue in animals and man, on the manifestations of the phenomenon of induced heat tolerance and on mechanisms for realization of the effect of induced hyperglycemia.

Reports were also presented by S. P. Yarmonenko (Moscow), Yu. P. Istomin, V. I. Prokhorova, M. M. Val'shteyn, I. N. Zhuravkin and Ye. I. Aleksandrova (Minsk), A. M. Veksler and M. M. Vilenchik (Pushchino-na-Oke). They discussed the current directions of research into the mechanisms of realizing the effects of hyperthermia and hyperglycemia. An important place among these questions belongs to the problems of optimal combination of hyperthermic and radiation effect, the study of blood flow disruptions in tumoral and normal tissues during thermo-radiation therapy, and and problems of post-radiomodification.

At the second session, Candidate of Medical Sciences E. A. Zhavrid (Minsk) presented a review lecture on the results of clinical studies in our country. At the present time, there are over 1,000 patients with various forms of malignant tumors receiving treatment with the application (in various combinations) of hyperthermia. Among these are patients with melanoma, tumors of the mammary gland, cancer of the rectum and body of the womb, osteogenic sarcoma and others. Various methods have been developed for localized and general hyperthermic effect, followed by radiation, pharmaceutical or surgical treatment. Thirteen institutions throughout the country have equipment for performing general and localized hyperthermia. The introduction of unified protocols for the application of hyperthermia and hyperglycemia in the treatment of a number of malignant tumors remains a current problem. Yu. S. Mardynskiy, G. Z. Menteshashvili (Obninsk), T. V. Muravskaya, V. I. Bezruchko, V. M. Lezzhov, and L. L. Avdey (Minsk) participated in the discussion on this talk. N. A. Grigorovich (Minsk) pointed out the need for expanding work on the study of immunity and non-specific resistance in patients subjected to thermoradiation treatment or thermochemotherapy.

The third session was devoted to a discussion of the state of affairs in the production of equipment for localized and general hyperthermic effect. At the present time, equipment has been developed in our country which makes it possible to perform localized heating of superficial and cavitary tumors. In the discussion on this question, V. Ye. Klyuch (Obninsk) reported that the USSR Academy of Medical Sciences Scientific-Research Institute on Medical Radiology has developed a device for localized heating of deep-seated tumors which is based on the domestic physiotherapeutic instrument "Ekran-1". This device is presently being used in thermoradiation therapy of patients with osteogenic sarcoma and tumors of the lungs and larynx. V. Ye. Kratenok, A. V. Boltushkin, O. P. Sazanovich, A. A. Slatin, and L. Ya. Kovrikova (Minsk) also participated in the discussion. They noted the importance of resolving the problem of thermometry in performing sessions of general and localized hyperthermia.

In conclusion, there was a general discussion of the questions under review and a decision was adopted with specific recommendations for the development of experimental and clinical research. Moreover, the work of the coordinating council for the remaining years of the 11th Five-Year Plan was reviewed and proposals for the development of work in this direction in the 12th Five-Year Plan were submitted. The conference materials are published in the collection of scientific works entitled "Application of Hyperthermia and Hyperglycemia in the Treatment of Malignant Tumors" (Minsk).

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UDC 616.233-002.2-02:613.633]-036.866

DISABILITY EVALUATION AND OCCUPATIONAL REHABILITATION OF MECHANICAL ENGINEERS  
WITH CHRONIC DUST-INDUCED BRONCHITIS

Moscow SOVETSKAYA MEDITSINA in Russian No 6, Jun 84 (manuscript received  
5 Apr 83) pp 61-64

KLEYNER, A.I., MAKOTCHENKO, V.M., YEFREMOVA, V. A. and KHIZHNYAKOVA, L.N.,  
Scientific Research Institute of Labor Hygiene and Occupational Diseases;  
Ukrainian Institute for the Advanced Training of Physicians, Kharkov

[Abstract] An 18 year follow-up study was conducted on 103 workers in a  
mechanical engineering plant with coniotic bronchitis. Over that period  
of time, regular disability evaluations showed that in 75.8% of the cases  
there was marked deterioration in the clinical status of the subjects, and  
a concomitant increase in the number of workers declared to be disabled.  
The situation was complicated by inadequate medical care and rehabilitative  
measures, delayed hospitalization, and failure of social and hygienic ser-  
vices to control the work environment. Assessment of the patients themselves  
revealed that, in most cases of coniotic bronchitis, the degree of disability  
can be evaluated from physical exertion tests involving a 400 kg-m/min  
(70 W) load. References 27 (Russian).

[1543-12172]

UDC 616-057:613.6:636.5]:313.13

MORBIDITY AND TEMPORARY DISABILITY OF POULTRY FARM WORKERS

Moscow SOVETSKAYA MEDITSINA in Russian No 6, Jun 84 (manuscript received  
28 Mar 83) pp 72-76

KATUNTSEVA, N.A., MONIKI [expansion unknown] imeni M.F. Vladimirskiy

[Abstract] Morbidity and temporary disability patterns were analyzed at 8  
poultry farms in the Moscow Oblast, which showed that morbidity stood at  
859.2 cases per 1000 workers, and accounted for 9676.6 lost workdays for the  
1000 workers. In both studies, morbidity and disability were greater in the

case of women, 195 cases and 1084.1 days, respectively ( $P < 0.001$ ). The major morbidity contributing to temporary disability consisted of respiratory diseases (50.6% of total cases, and 33.7% of the lost workdays. In that category respiratory infections played a primary role (77.6%, and 66.6% of lost days). Musculoskeletal disorders were next in importance in contributing to total morbidity (11.2%) and disability days (12.8%), followed by disorders of the cardiovascular system (6.8% and 9.1%, respectively). In the latter category, hypertension and ischemic heart disease were responsible for most of the morbidity, with the former predominating among the female workers and the latter among the males. The frequency of morbidity and disability increased with age, being lowest in the younger (20-29 years) workers. These statistics demonstrate that poultry farm workers require constant medical monitoring and readily available ambulatory services. In addition, it is evident that every care should be taken to mitigate the adverse effects of various work-related factors.  
[1543-12172]

#### ALCOHOL AS HEART POISON

Moscow MEDITSINSKAYA GAZETA in Russian 10 Oct 84 p 3

VIKHERT, A., head, Department of Cardiovascular Pathology, All-Union Cardiological Center, USSR Academy of Medical Sciences, corresponding member, USSR Academy of Medical Sciences, and TSYPLENKOVA, V., senior scientist, candidate of medical sciences

[Abstract] Although the term "alcoholic cardiomyopathy" was coined in 1902, this pathologic entity is by-and-large ignored by clinicians and pathologists alike. Most commonly, a diagnosis of coronary heart disease is made, although research over the past 6-7 years has clearly established alcoholic cardiomyopathy as an independent nosologic entity. Analysis of more than 500 autopsies of cases of sudden cardiac death has shown that 25-30% of such deaths were due to alcoholic cardiomyopathy in individuals less than 60 years old. In such cases the lumen of only one of the coronary arteries is somewhat narrowed (by 10-20%), and there is no evidence of a fresh thrombus or infarction. Unequivocal evidence of coronary vasospasm is not always present, and macroscopically the heart has a lackluster, clayey color. Histologically focal, progressive atrophy of the muscle fibers is in evidence, together with fatty tissue infiltration; these changes affect the left ventricle primarily. Approximately 40% of cases of sudden cardiac death below the age of 40 appear to be due to alcoholic cardiomyopathy. Since the earlier stages of this disease appear to be reversible, it is extremely important that physicians show a greater appreciation of this disease and maintain a high index of suspicion.  
[1541-12172]

## MICROBIOLOGY

UDC: 615.371:579.843.1].07

### STANDARDIZATION OF CHOLERA VACCINE, PRODUCTION OF NATIONAL REFERENCE PREPARATION

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 8, Aug 84 (manuscript received 26 Apr 83) pp 55-58

NENKOV, P., MANAKHILOV, R., POLIKAR A., KARACHOLEVA, M. and GENOVA, Yu.,  
Scientific Institute of Communicable and Parasitic Diseases, Medical Academy;  
State Institute for Testing of Medicinal Substances, Sofia

[Abstract] Results are presented from a comparison of a national reference preparation with the international reference preparation in experiments involving estimation of antigenicity in the active protection of mice tests. *Vibrio cholerae* Ogawa 41 and *V. cholerae* Inaba V 86 were used in tests on ICR white mice. It is established that the antigenicity of the national reference preparation is equal to or higher than the international reference preparation. Production series of cholera vaccine were found to be highly antigenic in parallel experiments performed with both reference preparations. References 7: 1 Russian, 6 Western.  
[1603-6508]

UDC: 579.8.083.13

### PHASE CHANGES IN PERIODIC BACTERIAL CULTURES

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 8, Aug 84 (manuscript received 26 Jun 83) pp 24-31

TETS, V. V. and KAMINSKIY, G. D., First Leningrad Medical Institute imeni I. P. Pavlov, First Moscow Medical Institute imeni I. M. Sechenov

[Abstract] The contribution of various paths of DNA metabolism to autoregulation of microbial populations interacting with the environment and for pathogenic microorganisms--in various stages of the infectious and epidemic processes--remains unclear. Model experiments in vitro could aid in the solution of this problem. During the period of exponential growth of microorganisms in culture the processes of DNA metabolism are to some extent



unique. They are directed toward reproduction, propagation and implementation of the optimal genetic material of the bacteria while depressing introduction and redistribution of information among the exponentially-growing cells. For bacterial cells in the phase of negative acceleration and the early portion of the steady state phase, a delay is characteristic in reproduction and implementation of information. As the steady phase begins, a change occurs in many fundamental processes with which the live cell is related and with which the primary movement of information through the cell occurs. The intensity of the SOS signal at this point depends on the force and dynamics of environmental conditions acting on the cell. The phase changes in periodic bacterial cultures can serve as an experimental model of the infectious and epidemic processes. The use of this model should aid in the study of the regularities of molecular-genetic determination of the variability of populations of pathogenic microorganisms during the course of infectious and epidemic processes. References 50: 25 Russian, 25 Western. [1603-6508]

UDC: 616.34-022.7:579.842]-092

#### ENTEROTOXIGENICITY AND NEURAMINIDASE ACTIVITY OF BACTERIA OF CITROBACTER GENUS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 8, Aug 84 (manuscript received 17 May 83) pp 32-34

BALANIN, N. V., YUDITSKAYA, N. M. and PETER, I. V., Moscow Scientific Research Institute of Epidemiology and Microbiology imeni G. N. Gabrichevskiy

[Abstract] Neuraminidase is known to be a pathogenicity factor in many bacteria. This work studies the presence of the thermolabile enterotoxin and neuraminidase activity in strains of *Citrobacter* isolated from various sources. Toxigenicity was determined in 78 strains of *Citrobacter* isolated from diarrhea patients. The presence of neuraminidase was determined in 41 *Citrobacter* strains. Enterotoxigenicity was determined by growing the bacteria on agar for 18 to 20 hours at 37°C, cultivation in saline solution for 24 hours at 37°C, centrifugation and storage of the toxin at -20°C for several weeks, after which toxins were tested on white mice based on the degree of edema of the paw into which the toxin was administered subcutaneously. Of 68 strains of *Citrobacter*, thermolabile enterotoxin was found in 13.2%. Moderately and highly toxic strains were isolated both from patients with sporadic acute intestinal infections and from healthy persons, and were in various serovars. Only 2 of 41 strains tested had active neuraminidase. Both of these were isolated from patients with acute intestinal infections. Neuraminidase is thus rarely found in *Citrobacter* strains. No correlation was observed between the enterotoxigenicity of a strain and the source from which it was isolated. Obviously, neither the thermolabile enterotoxin and neuraminidase are the main factor in pathogenicity and can cause clinical manifestation of diarrhea only in combination with other factors and favorable conditions. References 12: 4 Russian, 8 Western. [1603-6508]

USE OF IMMUNORADIOMETRIC ANALYSIS TO DETERMINE PERSISTENCE OF RICKETTSIAE AND THEIR ANTIGENS IN EXPERIMENTAL INFECTION OF COTTON RATS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 8, Aug 84 (manuscript received 10 Oct 83) pp 92-95

PROZOROVSKIY, S. V., IGNATOVICH, V. F., ALEKSEYEVA, N. V., KNYAZEVA, E. N. and BARKHATOVA, O. I., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] A study was made of the possibility of using a simplified version of immunoradiometric analysis (IRMA) to detect *p. rickettsiae* and their antigens in the organs and tissues of infected cotton rats. *Rickettsiae* and their antigens were determined in the organs and tissues of the rat as a model system for the reproduction of long-term persistence of the pathogen. The animals were infected intraperitoneally with egg *rickettsiae* cultures. They were later sacrificed, organs carefully ground with quartz sand and diluted with isotonic saline solutions. Blood serum was also studied in 1:10 dilution. Each specimen was tested for the presence of *rickettsiae* by the usual method. The indirect modification of IRMA was found to be highly sensitive in determining minimum quantities of *rickettsiae* and their antigens. The IRMA method was found to be effective in determining the antigens in the blood in the process of persistence of *rickettsiae* in the infected animals. References 8: 3 Russian, 5 Western.

[1603-6508]

SEROTYPES OF MENINGOCOCCI ISOLATED IN SOVIET UNION AND REPUBLIC OF CUBA

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 8, Aug 84 (manuscript received 8 Jun 83) pp 52-55

DEMINA, A. A., KOROLEVA, I. S., CAMPA, K. and PAUSTE, Kh., Central Scientific Research Institute of Epidemiology, USSR Ministry of Health, Moscow

[Abstract] A study is presented of the composition of serotype antigens of meningococcus isolated in the USSR and the Republic of Cuba. 100 strains of meningococcus of various serogroups were studied, isolated from patients and carriers in the USSR in 1980-1982 and 23 strains of serogroup B isolated from patients in Cuba in 1982-1983. The serogroups membership was established for 74 domestic strains and all the Cuban strains. Serotype 2 was found to predominate in the USSR. Strains isolated from patients had greater serotype activity than strains isolated from carriers. Many of the strains of group B isolated from patients in Cuba had a broad spectrum of typical antigens. Predominant were protein types 1, 2. For a large number of strains, lipopolysaccharide types 4, 5 and 8 were found. The results of the study of

serotype antigens in strains of meningococcus isolated in situations epidemic and nonepidemic for this serogroup do not allow type 2 to be considered a marker of virulence. Subtyping will apparently be necessary for this purpose. References 12: 4 Russian, 8 Western.  
[1603-6508]

UDC: 579.252:579.61:616.9-022.1

#### GENETIC PRINCIPLES OF VIRULENCE OF PATHOGENIC AND OPPORTUNISTIC BACTERIA

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 7, Jul 84 (manuscript received 10 Oct 83) pp 77-85

PETROVSKAYA, V. G., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Several general statements are formulated concerning the genetic testing of the virulence of bacteria based on analysis of data in the literature and studies in the author's laboratory. The three stages in the infectious process, penetration, reproduction and manifestation of pathogenic effect, are analyzed. The virulence of strains of a given species depends on the status of the genes which determine various pathogenic factors and genes important for the vital activity of the cell as well as the plasmids of groups I through IV. Occurrence of the pathogenic process requires simultaneous functioning of the chromosomal and extrachromosomal genetic apparatus of the bacterial cell. The data presented demonstrate the importance of genetic studies of pathogenic bacteria. Studies are now under way to determine and study pathogenicity factors, evaluate their role in the infectious process and immunity, study the structure and mechanism of action of pathogenicity factors and to study ligand receptors of interactions at the molecular level, the development of possible methods of receptor megatherapy, determine the most important protective antigens, study genetic control of immunogenesis related to these antigens, produce monoclonal antibodies, create artificial preparations and study specific immunologic reactions to them, to study genetic control of pathogenicity factors, cloning of genes, determining factors of pathogenicity, to construct strains with high production of the most important antigens and to study mechanisms of self-regulation of the pathogenic process. References 48: 23 Russian, 25 Western.  
[1593-6508]

## BIOLOGICAL ACTIVITY AND PHYSIOLOGICAL-BIOCHEMICAL PROPERTIES OF PHOSPHATE-DISSOLVING BACTERIA

Moscow MIKROBIOLOGIYA in Russian Vol 53, No 4, Jul-Aug 84 (manuscript received 12 Apr 83) pp 533-539

BABENKO, Yu. S., TYRYGINTA, G. I., GRIGOR'YEV, Ye. F., DOLGIKH, L. M. and BORISOVA, T. I., Dnepropetrovsk University

[Abstract] A study is presented of the physiological-biochemical properties of highly active groups of phosphate-dissolving bacteria, the regularities of bacterial transformation of tricalciumphosphate, and the ability of active strains to mobilize the phosphorus in ore minerals. Studies were performed on a collection of heterotrophic, gram-negative, phosphate-dissolving bacteria isolated in a study of 200 specimens of soil and 35 specimens of sea water. There were two morphologic groups: 373 strains of gram-negative bacteria and 17 strains of yeast. The bacteria isolated had a clear capability to dissolve tricalcium phosphate. A comparative study was made of the activity of the bacteria in mobilizing phosphorus from phosphates of Ca, Mn, Al and Fe. The activity and dissolution of these phosphates differed significantly among the various strains. Manganese phosphate was dissolved by 61% of the strains tested. Ca and Al phosphates were dissolved by 33 and 37% of the strains, Fe phosphate by only 6%. Some 164 strains were further tested for their ability to mobilize insoluble phosphates under standard cultivation conditions in a liquid medium containing tricalcium phosphate. Up to 56-229 mg/100 ml of medium were assimilated as  $P_2O_5$ . All of the strains tested can mobilize phosphorus upon acidification of the medium. The bacteria form organic acids, reducing the pH to 3.8-5.5. The data obtained indicate the possibility in principle of bacterial removal of phosphorus ore by mobilization of labile phosphates. *Erwinia carotovora* var. *carotovora*, strain 182, was found to be able to mobilize phosphorus from phosphate fertilizers as well. Figures 2; references 17: 9 Russian, 8 Western.

[874-6508]

## COMPARATIVE STUDY OF PLASMIDS CONTROLLING BIODEGRADATION OF NAPHTHALENE BY PSEUDOMONAS CULTURE

Moscow MIKROBIOLOGIYA in Russian Vol 53, No 4, Jul-Aug 84 (manuscript received 2 Mar 83) pp 639-644

KOCHETKOV, V. V. and BORONIN, A. M., Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino

[Abstract] Results are presented from a comparative study of naphthalene biodegradation plasmids in strains of *Pseudomonas* capable of growing on

naphthalene as the only carbon source. Soil cultures of *Pseudomonas* included the strain *P. putida*, *P. fluorescens* and *P. aeruginosa*. 25 bacterial strains were isolated from soil cultures capable of growing on naphthalene as the only carbon source. Study of transconjugates by the Echardt method showed the presence of high molecular mass plasmid DNA. It is concluded that in at least 14 of the 25 strains, catabolism of naphthalene is controlled by conjugative biodegradation plasmids. Plasmids of this type are usually in incompatibility group P-7 or P-9. Catabolism of naphthalene is controlled by plasmids and performed by means of salicylic acid and catechol, which is split by the metapath. References 15: 9 Russian, 6 Western.  
[874-6508]

UDC: 616.981.42-092.9

#### CHARACTERISTICS OF T- AND B-LYMPHOCYTES IN EXPERIMENTAL BRUCELLOSIS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA BIOLOGICHESKAYA  
in Russian No 4, Jul-Aug 84 pp 55-57

DZHASYBAYEVA, T. S., Scientific Research Institute of Epidemiology, Microbiology, and Infectious Diseases, Kazakh SSR Ministry of Health, Alma-Ata; Institute of Epidemiology and Microbiology imeni Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Studies were performed on 120 guinea pigs of both sexes, 90 of which were infected with a live culture of low virulence strain of *Br. abortus* 19-BA used for vaccination of humans. 8 to 10 ml of blood were taken from the heart to determine the quantity of T and B lymphocytes. The studies established that 30 days after sensitization there was an increase in the quantity of T-lymphocytes and a decrease in the population of B-lymphocytes. At later times (90 and 180 days), a decrease of both T and B lymphocytes in the peripheral blood was observed. References 5: 3 Russian, 2 Western.  
[1102-6508]

## NONIONIZING ELECTROMAGNETIC RADIATION EFFECTS

UDC 615.849.11.015.4:[612.821.3+612.621.31]-06:613.863

### EFFECT OF MODULATED ULTRAHIGH FREQUENCY FIELD ON BEHAVIOR AND HORMONE LEVEL IN FEMALE RATS UNDER EMOTIONAL STRESS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian No 3, May-Jun 84 (manuscript received 10 Nov 82) pp 13-16

RASULOV, M. M., Department of Pharmacology of Adaptation (headed by Ye. Ya. Kaplan, doctor of medical sciences), Scientific Research Institute for Biological Testing of Chemical Compounds, Moscow

[Abstract] The effect of a modulated electromagnetic field (MEMF) (field frequency of 40 MHz and modulated frequency of 50 Hz, 1 h exposure daily for 30 days) on behavior and level of sexual hormones, determined from the length of the estrous cycle and of its separate phases, was studied in female Wistar rats subjected to sexual deprivation. The ratio of frequency of running to number of vertical positions (R:V) was used as an index. Activity of rats declined during the 1-h exposure to MEMF; this may indicate the direct effect of MEMF on the central nervous system. Analysis of behavior after MEMF treatments ceased showed that the R:V ratio increased from 3.2:1 to 3:1 in month 3 and reached 2:1 in month 5. The relative significance of sexual behavior (lordosis, licking of perineum) more than doubled in comparison with the initial level. In the control group, the relative significance of sexual behavior increased by an order of magnitude. In rats exposed to MEMF, the estrus cycle was 34% longer in only 1 rat in month 3, whereas various cycle disturbances were observed in 50% of control animals. In month 5, typical shortening of diestrus and prolongation of estrus and metestrus phases were noted in 85% of control rats, whereas shortening of the diestrus phase and of the estrous cycle in general was noted in half of the test animals. By month 9, estrous cycle disturbances were noted in all animals. The findings support the existence of individual differences in sensitivity to a UHF field. The data on the estrous cycle indicate the tranquilizing effect of a UHF field on the neuroendocrine system and the greater resistance of individual animals exposed to MEMF to the development of sexual neurosis. Figures 2; references 12: 6 Russian, 6 Western.  
[1521-9307]

METHODICAL APPROACHES TO DETERMINATION OF SANITATION PROTECTIVE ZONE DIMENSIONS  
AROUND TV CENTERS AND TV RETRANSMITTERS

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received  
22 Dec 83) pp 62-65

DUMANSKIY, Yu. D., IVANOV, D. S., KARACHEV, I. I., BITKIN, S. V. and  
PAVLOVA, V. M., Kiev Scientific Research Institute of General and Communal  
Hygiene imeni A. N. Marzeyev

[Abstract] As the number of TV stations and TV retransmitters increases, so does the potential danger to the population from exposure to meter and decimeter long electromagnetic waves. Therefore it is extremely important to analyze each individual station and to develop a volume and space sanitation protective zone (SPZ) for each station. The SPZ is the area around the emission source at the border of which the electromagnetic field (EMF) is at the maximum permissible level. Determination of the radius of such SPZ from the equipment used at TV stations is a very complex problem. Therefore a simplified method was developed consisting of four steps, three of which still would have to be performed by specialists from research centers: 1) calculation of field intensity for a typical center, 2) plotting of distance-intensity functional curves, 3) plotting of the distribution curves for SPZ radii as a function of the height, and 4) actual determination of SPZ area around the TV station by sanitary engineer specialists. This approach would create an atlas of curves for various TV stations characterizing the relationships between field intensity and the distance from EMF source, applicable in field situations. Figures 2; references 5 (Russian).  
[1552-7813]

UDC: 612.111.014.44

FUNCTIONAL AND STRUCTURAL CHANGES IN HUMAN ERYTHROCYTE SURFACE AFTER  
IRRADIATION BY UV WAVES OF VARIOUS WAVELENGTHS. REPORT 1. EXPRESSION OF  
ABO AND RHESUS SYSTEM ANTIGEN

Leningrad TSITOLOGIYA in Russian Vol 25, No 12, Dec 83 (manuscript received  
15 Jul 83) pp 1378-1386

SAMOYLOVA, K. A., KLIMOVA, K. N., PRIYEZZHEVA, L. S. and ARTSISHEVSKAYA, R. A.,  
Institute of Cytology, USSR Academy of Sciences, Leningrad; Leningrad Scientific  
Research Institute of Hematology and Blood Transfusion, RSFSR Ministry of  
Health

[Abstract] An attempt was made to determine whether shortwave UV (SUV) radiation causes changes in the external surface of human erythrocytes, modifying the expression of the ABO and Rh system antigens known to be related to the surface of the cells. The work was performed on erythrocytes in a

structurally prepared erythrocyte mass from the blood of 23 donors stabilized by glucicir or heparin. Three series of experiments were performed: on isolated erythrocytes, before irradiation thrice washed to remove plasma with isotonic NaCl 0.9% and resuspended at  $5 \cdot 10^7$  cells per milliliter; on erythrocytes diluted to  $5 \cdot 10^7$  cells per milliliter; and on erythrocytes on the undiluted erythrocyte mass about  $7.5 \cdot 10^9$  cells per milliliter. SUV radiation at 254 nm was used at a power of  $4.1 \text{ W/m}^2$  for 1 to 60 minutes. The agglutinating activity of the ABO and Rh antigens was then studied. Two to three hours after exposure to 248, 620, 1240 and  $2480 \text{ J/m}^2$ , the degree of hemolysis of isolated erythrocytes increased by 5, 10, 18 and 28%. Changes were also observed in agglutinating activity of ABO antigens. The agglutinating activity of A and B antigens increased by an average factor of 2--H antigens by a factor of 4. SUV radiation did not cause any reliable activation of the Rh antigen. References 14: 11 Russian, 3 Western. [873-6508]

UDC: 612.111.014.44

FUNCTIONAL AND STRUCTURAL CHANGES IN HUMAN ERYTHROCYTE SURFACE AFTER IRRADIATION BY UV WAVES OF VARIOUS WAVELENGTHS. REPORT 2. ADSORPTION OF ALCYAN BLUE BY EXTERNAL PREMEMBRANOUS COMPONENTS

Leningrad TSITOLOGIYA in Russian Vol 25, No 12, Dec 83 (manuscript received 15 Jul 83) pp 1387-1392

ARTSISHEVSKAYA, R. A. and SAMOYLOVA, K. A., Institute of Cytology, USSR Academy of Sciences, Leningrad

[Abstract] A method developed previously by the authors for quantitative determination of external premembranous layers of cells was used to determine the extent to which shortwave ultraviolet (SUV) radiation influences the status of this structure in human erythrocytes. An erythrocyte suspension from freshly prepared donor blood stabilized by heparin or glucicir was prepared and irradiated as previously described. Manifestation of external premembranous layers in nonirradiated and irradiated erythrocytes was judged by the adsorption of a cationic phthalocyanine dye. Optimal staining conditions were found: concentration of cell suspension  $10^8$  cells/ml, concentration of dye solution 0.005%, staining time 10 minutes. The influence of SUV on adsorption of erythrocytes results in a reliable decrease in dye sorption. Small and medium doses cause a reduction in sorption, while the highest dose used,  $3720 \text{ J/m}^2$ , causes an increase of 19.5% in dye sorption, sometimes up to 40-50%. It is thought that structural perturbation of the erythrocyte surface may cause activation not only of ABO and Rh antigens, but also other antigens, as well as changes in a number of properties and functions of the cells which involve specialized cell surface systems such as receptors, enzyme groups, etc. References 24: 21 Russian, 3 Western. [873-6508]



UDC 615.272.4:547.466.64].015.4:612.262

ANTIOXIDANT ACTION OF GLUTAMIC ACID

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EXPERIMENTAL'NAYA TERAPIYA in Russian  
No 4, Jul-Aug 84 (manuscript received 2 Nov 82) pp 60-62

[Article by N. A. Udintsev and V. V. Ivanov, Department of Biochemistry,  
Tomsk Medical Institute]

[Text] Glutamic acid is used to treat a number of hepatic, lung, and brain diseases of various origin [1, 6]. Its favorable effect on metabolism in vascular circulatory disorders [2], metabolic disturbances, and their correction when the body has been exposed to magnetic fields has been shown experimentally [10, 11]. In considering the metabolic characteristics of the amino acid [4] and its effectiveness in the activation of the peroxide oxidation of lipids [8], we have suggested that it exhibits antioxidant activity. In order to test our hypothesis we conducted an experiment on a previously studied model of lipid peroxide oxidation stimulation (POL) by means of the repeated action of an alternating magnetic field. This results in a significant increase in the hepatic level of peroxidation products and a decrease in the antiperoxide potential [7].

Method. Experiments were conducted on 32 white, non-linear male rats, 160-190 grams in weight. POL stimulation was accomplished by an alternating magnetic field with a frequency of 50 Hz applied five times for 6 and 1/2 hours per day [11]. A neutralized solution of glutamic acid at a dose of 1 mg per 1 gram of weight was injected subcutaneously 1 hour before each application of the magnetic field. The condition and POL were evaluated by the level of diene conjugates in the liver [15]. Anti-radical activity was examined by using the stable, free radical  $\alpha$ -diphenyl- $\alpha$ -picrylhydrazyl [12]. Also determined were the activity of glutathioneperoxidase [14], the catalyzing reduction of fatty acid peroxides and the activity of glutathionereductase [13] which reduces the glutathione which plays an important role in blocking the peroxidation reaction in the body. The experimental results were processed statistically by the use of the Wilcoxon-Mann-Whitney non-parametric criterion [5].

# Influence of an Alternating Magnetic Field and Sodium Glutamate on Indices of Peroxide Oxidation of Lipids in the Liver ( $M^{\pm}_m$ )

(1a) Условия опытов	(1b) Содержание диеновых конъюгатов, $D_{233}$ /мг липидов	(1c) Антирадикальная активность, мкэкв на 1 г липидов	(1d) Содержание восстановленного глутатиона, мкмоль на 1 г печени	(1e) Активность глутатионредуктазы, нмоль НАДФ·Н/мин на 1 мг белка	(1f) Активность глутатионпероксидазы, мкмоль глутатиона восстановленного в 1 мин на 1 мг белка
1. Контроль (8)	0,62±0,03	11,5±1,0	5,73±0,48	37,1±2,0	0,384±0,025
2. Действие магнитного поля (8)	0,82±0,07*	8,1±1,1**	4,67±0,39	32,5±2,3	0,305±0,024**
3. Введение глутамата натрия (8)	0,61±0,05	10,4±1,2	6,00±0,45	38,6±3,3	0,401±0,033
4. Введение глутамата натрия перед действием магнитного поля (8)	0,65±0,04**	10,8±0,6*	5,57±0,33	44,0±2,4*	0,452±0,026*

(5) П р и м е ч а н и е. В скобках — число животных. Одна звездочка —  $P < 0,01$ , две —  $P < 0,05$ . Вторая группа сопоставляется с контролем, четвертая — со второй.

## Key:

- 1a. Experimental conditions
- 1b. Diene conjugate content,  $D_{233}$ /mg of lipids
- 1c. Anti-radical activity, microequivalents per 1 gr of lipids
- 1d. Content of reduced glutathione, mmoles/1 gram of liver
- 1e. Activity of glutathionereductase, n mols of NADF.H [expansion unknown]/min per 1 mg of protein
- 1f. Activity of glutathioneperoxidase, mmoles of glutathione recorded in 1 minute per 1 mg of protein
1. Control (8)
2. Action of the magnetic field (8)
3. Administration of sodium glutamate (8)
4. Administration of sodium glutamate prior to the action of the magnetic field (8)
5. Note. The number of the animals is indicated within the parentheses. One asterisk-- $P < 0.01$ , two asterisks-- $P < 0.05$ . The second group is compared to the control, the fourth group is compared to the second.

**Results and Discussion.** The diene conjugate content in the liver significantly increased following repeated applications of the magnetic field (see Table). We noted earlier that under these conditions there was an increase in the chemiluminescence of lipid hydroperoxides [7] which is apparently due to the reduction in anti-radical activity as well as to glutathioneperoxidase suppression. An increase in the activity of biphosphatase was detected in an analogous experiment [10] which is indicative of POL process stimulation [9].

The administration of glutamic acid to the intact animals did not have any significant effect on the indicators under examination.

Another result is made evident when the free radical processes are intensified. The administration of glutamic acid prevents the accumulation of peroxidation products so that the amount of diene conjugates in them is practically the same as in the control animals. The normalization of bi-phosphatase activity in the experimental animals was observed in an analogous experiment following the injection of amino acid [10]. In analyzing the factors that regulate the peroxidation processes, one can see (see Table) that a preliminary injection of glutamic acid significantly increases anti-radical activity (by 33 percent) and enhances the activation of the glutathioneperoxidase that takes part in the detoxication of lipid peroxides. The activation of this enzyme was apparently the reason for the comparatively small increment in the substrate of the reduced glutathione reaction, despite the significant activation of the glutathionereductase which enhances its reduction. It also seems that the stimulation of the glutathioneperoxidase reaction, while enhancing greater utilization of the lipid hydroperoxides along the enzyme path, by the same token obstructs a reduction in the anti-radical activity of lipids during exposure to the magnetic field.

The antioxidant effect of glutamic acid has a complex origin. The active participation of the amino acid in the synthesis of glutathione is of importance as is its possible intensive conversion through succinic aldehyde to  $\delta$ -oxybutyric acid which has a clear antioxidant property [9]. By changing the activity of  $A_2$  phospholipases, glutamic acid and some of its metabolites facilitate the removal of toxic peroxidized fatty acid residues of phospholipids [3]. We believe that the antioxidant effect of glutamic acid which we detected significantly expands an understanding of its role in both normal and pathological metabolism and is the basis for corresponding investigations under clinical conditions.

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CSO: 1840/1523

ROLE OF PEPTIDES IN MECHANISM OF STABILIZATION AND ACTIVATION OF GENERATORS OF PATHOLOGICALLY ENHANCED EXCITATION

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian No 3, May-Jun 84 (manuscript received 19 Oct 83) pp 81-84

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[Abstract] The role of peptides in the activation of generators of pathologically enhanced excitation (GPEE) and their possible participation in pathological processes are investigated. The synthesized hexapeptide Tyr-Gly-Gly-Phe-Leu-Arg, which induces positional asymmetry in animals, was used as the GPEE activator in random-bred albino rats. Muscle rigidity was produced in a hind leg by administration of  $1/40$  LD<sub>min</sub> of tetanus toxoid (TT), which induces GPEE formation in disinhibited intercalary neurons and mononeurons. The hexapeptide was administered in a dose of 100 µg/kg 48 h after TT (series I) when signs of extensor tension were not yet evident and 30 days after TT when clinical signs of muscle rigidity disappeared. In series I, the hexapeptide produced marked extension of the leg previously injected with TT. Electromyograms revealed significant electrical activity in the form of long asynchronous impulses. In series II, the peptide produced a marked increase in muscle tension in the previously treated leg, as indicated by extension of the foot and appearance of typical electrical activity. Thus the hexapeptide activated GPEE both during its formation and clinical elimination; this effect did not depend on natural asymmetry of muscle tone. The reactivation of GPEE in the phase of clinical recovery indicates that the pathological process is not totally eliminated by this phase. ACTH<sub>4-7</sub> and lysyl vasopressin, which are involved in physiological memory, were used to study the effect of peptides, exerting a stimulating and stabilizing effect on memory, on processes underlying neuropathological syndromes in a model of local muscle rigidity. The ACTH fragment or lysyl vasopressin was administered in a dose of 100 µg/kg twice daily for 3 days starting 72 h after TT administration. ACTH<sub>4-7</sub> and lysyl vasopressin were found to prolong GPEE activity by 5-7 days; GPEE may therefore be regarded as a unique form of pathological memory. The investigations support the theory that peptides participate in pathological processes in the central nervous system and act as modulators with a stabilizing or destabilizing effect on pathological systems. Figures 2; references 11: 7 Russian, 4 Western. [1521-9307]

EFFECT OF SUBSTANCE P AND ITS FRAGMENTS ON ACTIVITY OF ANGIOTENSIN CONVERTING ENZYME

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian No 3, May-Jun 84 (manuscript received 19 Oct 83) pp 79-81

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[Abstract] The inhibiting effect of synthesized substance P (SP) on angiotensin converting enzyme (ACE) was studied in experiments with unpurified (human serum) and purified (pig lungs) ACE. Enzyme activity was determined by fluorometry with hippuryl-histidine-leucine as substrate; captopril ( $10^{-5}$  M) was used as control for ACE inhibition. Comparison of the inhibiting effect ( $I_{50}$ ) of SP and its N- and C-terminal fragments on unpurified ACE revealed that hydrolysis fragments  $SP_{1-4}$  or  $SP_{3-4}$  (Lys-Pro) were responsible for the inhibiting activity. Different findings were obtained with use of highly purified ACE (purification on DEAE cellulose, gel filtration on Sephadex G-200, electrophoresis in SDS polyacrylamide gel). Similar  $I_{50}$  were obtained for  $SP_{3-4}$ , but fragments  $SP_{5-11}$  and  $SP_{1-2}$  were ineffective; the inhibiting effect of the entire SP molecule was also much lower. Cleavage of SP into fragments, thus producing active inhibiting fragments, by various enzymes (dipeptidyl peptidase IV, serum cholinesterase, acid protease, and postproline-cleaving enzyme) present in ACE preparations is discussed. The biological significance of the ACE-inhibiting (regulating) activity of SP is considered. References 16: 1 Russian, 15 Western. [1521-9307]

UDC 616.89-008.447-092.9-092:616.831-008.94:577.175.82

MONOAMINERGIC MECHANISMS OF REGULATING EFFECT OF SEVERAL SHORT PEPTIDES IN SIMULATION OF BEHAVIORAL DISORDERS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian No 3, May-Jun 84 (manuscript received 19 Oct 83) pp 60-67

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[Abstract] The effect of C-terminal fragments of peptide hormones: gastrin 13-15, Met-Asp-Phe-NH<sub>2</sub> (MAP); oxytocin 7-9, Pro-Leu-Gly-NH<sub>2</sub> (MIF, melanostatin), and taftsin, Thr-Lys-Pro-Arg-OH (TAP), on behavior (emotional stress, depression, extreme situations - escape from water-filled container) in animals (cats, rats, mice) was studied, and the association between these effects and the involvement of the peptides in monoaminergic processes was

elucidated. The peptides had a marked emotiotropic and regulatory effect (in case of disorders) on emotional behavior. Each compound had its own individual range of psychotropic activity. The major effect of MIF was stimulation of behavior, which did not depend on the original emotional responsiveness. This peptide did not always have an optimizing effect, since additional stimulation of emotional reactions in highly emotional animals produced inadequate responses. MAP had a predominantly sedative effect on behavior. In the extreme situations, MAP had a regulatory, modulating effect typical for peptides. TAP optimized the behavior of animals in stress situations. In the first phase of its action, TAP had a distinct antidepressive effect. Analysis of the physiological effects of these peptides revealed that MIF acts primarily on dopamine and less actively on serotonergic processes; MAP reduces the level of homovanillic acid, whereas TAP increases the content of this acid in the brain. Data obtained in experiments on changes in rotational behavior of animals with altered dopamine terminals indicated that these peptides act as modulators in monoaminergic systems; this is responsible for their behavioral effects and for the association between the regulatory effect and the original emotional responsiveness. References 25: 11 Russian, 14 Western.  
[1521-9307]

#### PHARMACEUTICALS FROM PLANTS

Moscow VECHERNYAYA MOSKYA in Russian 22 Aug 84 p 2

GRINKEVICH, N., Professor, Chief, Department of Pharmacognosy, First Medical Institute imeni I. M. Sechenov

[Abstract] Students of the author's institute are studying all of the plant-based medications in the pharmacopeia, their chemical composition and methods of quality control. Workers in the department have found plant extracts which normalize heart rhythm in cardiac pathology. Asian plants which prevent cholecystitis have also been found. Another plant is effective to the treatment of nephritis and pyelonephritis. The studies of the institute have determined areas in the country where the best medicinal plants which are growing wild can be collected.  
[828-6508]

## MAJOR TRENDS IN RESEARCH ON SUBSTANCE P (REVIEW)

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian  
No 3, May-Jun 84 (manuscript received 19 Oct 83) pp 57-59

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[Abstract] Three aspects of research on substance P (SP) are reviewed: the relationship between stress, SP and catecholamines, modulator effect of SP on pain threshold in rats, and some trends in research on SP. SP was found to normalize stress-induced autonomic and central disorders; this effect was not related to the constant presence of the peptide, but to its capacity to cause long-term changes. Correlations were also found between stress-induced changes in the catecholamine system and SP. SP was found to have a dose-dependent effect on the pain threshold: it was an analgesic at low doses and hyperalgesic at high doses. This effect also depended on the original state of the muscles, a fact which was the basis for the theory that SP is a regulatory peptide. These opposite effects were also used to describe the behavior of SP in terms of "Yin-Yang." Most research on SP has centered on the effect of this peptide on smooth muscles, blood circulation and secretory functions. Investigations on the relationship between structure and function have identified various parts of the SP molecule responsible for certain activities. Current studies on the physiology of SP have concentrated on elucidating an association between sensory processes in which SP plays a role and the interaction of the peptide with aminergic systems. New approaches in research on SP and new experimental models are necessary, as well as more data on the molecular biology of SP, including its biosynthesis, metabolism, and receptors. References: 24 (Western).  
[1521-9307]

UDC 577.175.82+612.014.46:577.175.82

## SUBSTANCE P: STRUCTURE AND ACTION

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian  
No 3, May-Jun 84 (manuscript received 19 Oct 83) pp 71-73

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[Abstract] Various aspects of the relationship between the structure of substance P (SP) and its biological activity are reviewed. SP has been successfully synthesized, and purified preparations contain less than 3% of other peptides after high-pressure liquid chromatography. The lipophilic and hydrophilic regions of the molecule create problems for the experimenter in that it has a great tendency for adsorption on plastic, glass, and metal



surfaces and for forming aggregates and gels. It exhibits stereochemical variability in water, but forms stable conformations with lipophilic structures, such as those found in membranes. Analysis of the activity of SP in relation to its structure revealed that the C-terminal lipophilic pentapeptide is the essential fragment for biological activity. Hydrophobic amino acids at positions 7, 8 and 10 are also essential for activity. The peptide is inactivated by neutral metalloendopeptidase, but an enzyme-resistant analog with about 10% of SP's activity has been synthesized. SP analogs with central-nervous-system activity have been produced as well. The beta-aminoethylamide of SP was found to bind 5-10 times more efficiently to receptors in the brain and to have a greater effect on neuron depolarization than SP; it is therefore the most promising analog with selective central activity. Figure 1; references 20: 2 Russian, 18 Western.  
[1521-9307]

UDC 616.8-009.81+616.12-008.331.1]-02:577.175.82]-092.9

SUBSTANCE P AS A REGULATOR OF FUNCTIONAL DISORDERS IN PRIMATES: EFFECT ON  
CONDITIONED REFLEX ACTIVITY AND ARTERIAL PRESSURE DYNAMICS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian  
No 3, May-Jun 84 (manuscript received 19 Oct 83) pp 73-75

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[Abstract] The effect of substance P (SP) on the elaboration of a conditioned food reflex was studied in baboons Papio hamadryas with persistent neurotic disorders in higher nervous activity, which altered the animals' capacity for differentiation. Partial normalization of conditioned reflex activity occurred after administration of SP in doses of 0.25-25 µg/kg. Polyuria, saliva production, and reddening of the face were observed at a SP dose of 250 µg/kg; these autonomic responses were not present at low doses. Findings indicated that the optimal dose for a central effect in primates was 2.5 µg/kg (intravenous, i.v.). The differences found in the central and autonomic effects indicate the existence of different mechanisms of action. Administration of SP (2.5 µg/kg, i.v.) to animals with neurogenic hypertension induced by cardiopathogenic stress normalized arterial pressure. SP also reduced arterial pressure in animals with hypertension of 1 and 10 years duration. Figures 3; references: 4 (Western).  
[1521-9307]

## BIOLOGICAL EFFECT OF N-TERMINAL FRAGMENTS OF SUBSTANCE P

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian  
No 3, May-Jun 84 (manuscript received 19 Oct 83) pp 75-77

YENCH, K. D., OEHME, P., LINDNER, G., PEGELOV, I. and NEIBERT, K., Institute of Biologically Active Substances, GDR Academy of Sciences; Institute of Anatomy, Medical Faculty, University imeni Humboldt; Institute of Pharmacology and Toxicology of the University imeni V. Pick; Biology Faculty of the University imeni M. Luther

[Abstract] The biological effect of the N-terminal dipeptides (Arg-Pro and Lys-Pro) of substance P (SP) on nerve fiber regeneration and macrophage activation was analyzed. Neuron fiber regeneration was studied in tissue cultures of chick embryo telencephalon (central nervous system, CNS) and trigeminal ganglion (peripheral nervous system). The dipeptides ( $5 \cdot 10^{-4}$  to  $5 \cdot 10^{-8}$  M) had a regenerating effect on the peripheral nervous system but were inactive toward the CNS. Only the partially protected dipeptide Lys-Z(NO<sub>2</sub>)-Pro·HCl (SP<sub>3-4</sub>) enlarged the zone of nerve growth, but both this dipeptide and Arg-Pro·2 HCl (SP<sub>1-2</sub>) increased nerve growth intensity; the unprotected dipeptide Lys-Pro·2 HBr was biologically inactive. Optimal dipeptide activity occurred at  $10^{-6}$  and  $5 \cdot 10^{-7}$  M. These findings coincide with data for SP<sub>1-11</sub> ( $10^{-4}$  M). The effects of the dipeptides and SP<sub>1-11</sub> on macrophage activation were studied in peritoneal macrophages from the abdominal cavity of mice. SP<sub>1-2</sub> had a median effective dose (ED<sub>50</sub>) of  $10^{-11}$  M; SP<sub>1-4</sub> had an ED<sub>50</sub> =  $5 \cdot 10^{-11}$  M and SP<sub>3-4</sub> had a value between that of these peptides. SP<sub>1-11</sub> was comparable in activity to the N-terminal fragments (ED<sub>50</sub> =  $10^{-11}$  M). Figures 2; references: 15 (Western).  
[1521-9307]

## SUBSTANCE P IN BLOOD PLASMA AND ADRENALS IN SPONTANEOUSLY HYPERTENSIVE AND NORMOTENSIVE RATS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian  
No 3, May-Jun 84 (manuscript received 19 Oct 83) pp 77-79

RATSAK, R., ROSKE, I., OEHME, P. and HILZE, H., Institute of Biologically Active Substances, GDR Academy of Sciences, Berlin

[Abstract] Immunoreactive substance P (ISP) was determined in the plasma and adrenals (medulla) of normotensive (NT) rats and rats with spontaneous hypertension (HT); the animals were subjected to stress induced by intermittent high-frequency sound. A significantly ( $P < 0.01$ ) lower level of ISP was found in the serum of HT than of NT rats; these changes in ISP level were not age-related. In contrast, there was a considerable decline in ISP with age in the

adrenal medulla, but differences between HT and NT rats were not statistically confirmed. Stress raised adrenal ISP level in NT rats, and lowered it in HT rats. The causes for the decline in ISP in the adrenal medulla and plasma of HT rats may include an insufficient reserve of SP precursors, delayed SP biosynthesis, and accelerated SP degradation. References 9 (Western).  
[1521-9307]

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#### ACTION OF PEPTIDES IN HEMORRHAGIC SHOCK

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian No 3, May-Jun 84 (manuscript received 19 Oct 83) pp 85-87

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[Abstract] The effect of the peptide Pro-Leu-Gly-NH<sub>2</sub>, or *d*-melanotropin-release-inhibiting factor (MIF), on the course of hemorrhagic shock was studied in Wistar rats. MIF was found to prevent death and to prolong life during shock, like naloxone and thyrotropin-releasing hormone. Survival of rats given MIF (2 mg/kg) was 36% after 5 h, versus 7% in control. Administration of 4 mg/kg of naloxone increased 5-h survival from 10 to 45%. The mechanism of action of MIF was studied in isolated ileum from morphine-dependent rats. Both naloxone and MIF produced typical contractions of the ileum. When added with MIF, naloxone was found to potentiate the effect, but MIF partially suppressed naloxone-induced contractions. Thus, MIF acts on the same reactive sites as naloxone, namely  $\mu$ -receptors. Interaction with endogenous dopamines or opioid peptides may also be involved in MIF's mechanism of action in shock. Figures 3; references: 11 (Western).  
[1521-9307]

UDC 612.145-06:612.112.93.014.46:577.175.82

#### MAST CELLS AND SUBSTANCE P IN REGULATION OF MICROHEMODYNAMICS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian No 3, May-Jun 84 (manuscript received 19 Oct 83) pp 87-89

GORIZONTOVA, M. P. and IGNAT'YEVA, I. R., Institute of General Pathology and Pathological Physiology, USSR Academy of Medical Sciences, Moscow

[Abstract] The association of substance P (SP) with the state of mast cells, terminal blood flow and vascular permeability was studied in male Wistar rats and Syrian hamsters. Administration of SP in concentrations of  $7 \cdot 10^{-6}$  to  $7 \cdot 10^{-7}$  M to the mesentery of live rats resulted in peripheral aggregation

of leukocytes in venules and mast cell swelling and degranulation. These effects diminished with lower doses. A statistically significant increase in mast cell degranulation was observed only at concentrations of  $7 \cdot 10^{-7}$  and  $7 \cdot 10^{-8}$  M. Application of SP to the rat mesentery and hamster retrobuccal sac increased vascular permeability to fluorescein isothiocyanate-labeled rabbit globulin. The effect of SP on vascular permeability was also studied in rats in which mast cell reserves had been depleted by administration of preparation 48/80. SP failed to increase permeability in these animals. Similar experiments in hamsters showed that SP produced a slight decline in permeability, which was already elevated by preparation 48/80. The effect of SP on microhemodynamics and vascular permeability is mediated through vasoactive substances released from mast cells by the action of SP. Figures 4; references 14: 5 Russian, 9 Western.  
[1521-9307]

UDC: 616.9-022.38:579.852.13]-07

MORPHOLOGIC AND HISTOCHEMICAL STUDY OF EFFECT OF NATIVE ENTEROTOXIN OF CLOSTRIDIUM PERFRINGENS TYPE A ON MODEL OF LIGATED RABBIT ILEUM LOOP

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 7, Jul 84 (manuscript received 16 Nov 83) pp 106-110

YERMAKOVA, M. P., BAKULIN, I. N. and SERGEYEVA, T. I., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Studies using a ligated rabbit ileum loop model were performed on 9 rabbits. Native enterotoxins were administered to various segments of isolated intestines in various doses. In parallel, the enterotoxin was administered after preincubation for 30 minutes at  $37^{\circ}\text{C}$  with a specific anti-enterotoxin serum or normal rabbit sera. The native enterotoxin always caused accumulation of fluid and expansion of the ileum. The toxins of all enteropathogenic strains of *C. perfringens* used in the study caused identical pathomorphologic changes in the intestinal mucosa. The histopathologic activity of the enterotoxin was fully neutralized by the antienterotoxin perfringens serum developed by the authors. References 14: 3 Russian, 11 Western.  
[1593-6508]

# CERTAIN ASPECTS OF CHEMOTHERAPY OF BACTERIAL INFECTIONS

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 7, Jul 84 (manuscript received 14 Dec 83) pp 37-45

NAVASHIN, S. M., All-Union Scientific Research Institute of Antibiotics,  
Moscow

[Abstract] A study was made of the principles of effective antibiotic treatment, based on the mechanisms of action of the major antibiotics used in clinical practice. The factors which must be considered in determining antibiotic therapy are: changes in the etiologic structure and properties of the pathogen and course of the disease; elimination of boundaries between opportunistic and pathogenic organisms; propagation of hospital infections caused by epidemic strains of opportunistic microorganisms; appearance of new infections such as legionnaires disease; the search for methods of treatment of diseases caused by pathogens in blank areas of the spectrum of antibiotic therapy, such as viral infections; and increasing the effectiveness of treatment of infections caused by nonspore forming anerobes. Some merging of the objectives and approaches of chemotherapy and immune therapy is noted. Chemotherapy today is a unifying discipline, constantly providing physicians with new methods of treatment. References 5: 3 Russian, 2 Western.  
[1593-6508]

UDC 613.644.07

# STUDY OF DOSE-BIOEFFECT RELATIONSHIP WITH LONG TERM INDUSTRIAL NOISE

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received 31 Jan 84) pp 18-21

MUKHIN, V. V., ZVEREVA, G. S. and KOLGANOV, A. V., Scientific Research  
Institute of Labor Hygiene and Occupational Diseases, Donetsk

[Abstract] An attempt was made to verify the dose-effect relationship due to long term exposure to industrial noise. Workers (342) at rolling stock plants were evaluated. A statistically-significant relationship was found between the noise levels and the following health problems: hearing impairment, ear noise, disturbance of sleep, headaches, chest pains, increased heart beats, irregular pulse and dizziness. The highest correlation was found between the noise level and shift in hearing threshold. A sinusoidal relationship was noted between the systolic and diastolic arterial pressure and noise level with a maximum at 107-108 dBA. Thus it was shown that noise levels affect not only the hearing functions but also other "nonspecific" functions of human organism. Therefore the relationship between the noise exposure level and duration of employment may be regarded as an adequate "dose-bioeffect" index. Figures 4; references 14: 13 Russian, 1 Western.  
[1552-7813]

## EXPERIMENTAL DATA ON EMBRYOTOXIC, GONADOTOXIC AND MUTAGENIC STUDY OF HEXACHLOROPHENE ACTION

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received 23 Dec 83) pp 25-26

DYMIN, V. V., YUSHKOV, G. G., MINCHENKO, V. A., BOGACHUK, G. P., ANDROPOVA, S. N., PORTYANOY, A. A. and KUDRYAVTSEV, V. Yu., Institute of Biophysics, USSR Ministry of Health, Moscow

[Abstract] Recently a number of cellulose and viscose materials became available on which various antiseptics could be grafted: hexachlorophene (2,2-dihydroxy-3,3,5,5',6,6'-hexachlorodiphenylmethane -- HCP), copper ions, etc. Embryotoxic, gonadotoxic and mutagenic effects of HCP were studied in experiments on rats. In embryotoxic experiments, HCP was administered IP and through inhalation at a total dose of 40 mg/kg during the pregnancy term. In gonadotoxic experiments the animals inhaled HCP for 4 months. In both inhalation regimens the concentration of HCP was 33.5, 1.67 and 0.2 mg/m<sup>3</sup>. Mutagenic effects were determined on salmonella with and without metabolic activation, and by cytogenic analysis of chromosomal mutations in bone marrow. Analysis of the data showed that in inhalation experiments HCP exhibited embryotoxic and gonadotoxic effect only at doses of 33.5 mg/m<sup>3</sup>. Mutagenic effect was not observed at all in inhalation experiments. It was concluded that HCP could safely be used in production of antimicrobial cloth since at low concentrations it showed no dangerous effect on the reproductive functions. References 6: 2 Russian, 4 Western. [1552-7813]

UDC 614.777:615.285.7.099]-074

## TOXICOLOGIC EVALUATION OF PHOTOLYTIC PESTICIDE DESTRUCTION PRODUCTS

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received 12 Mar 84) pp 77-80

TSIPRIYAN, V. I. and MARTSENYUK, N. K., Kiev Medical Institute

[Abstract] Considering the fact that current water purification methods may lead to more toxic substances after the treatment, a new process was developed based on photolysis, and evaluated on the most common water contaminant: the pesticides. In the present paper results were reported of the toxicological evaluation of the products of photolytic destruction of pesticides: cyneb, benamyl, cuprozon, TMTD, topsin M, kelton, HCCH, acrex, caratan, chlorophos, carbophos, phosphamide and actellic. A scheme was designed for this evaluation which decreased the test period and the number of animals needed, achieved working concentrations of the substances, permitted the study of combined effects and facilitated determination of

maximum permissible concentrations for toxic metabolites. The products of the photolytic destruction of carbamates and dinitrophenols were found to be non-toxic; those of chloroorganic pesticides and organophosphoric compounds as well as various mixtures of these agents showed a significant drop in their toxicity. Further purification by means of electrocoagulation should lower the concentration of these toxic products to safe levels. References 13: 12 Russian, 1 Western.  
[1552-7813]

UDC 616.5+616-056.43]-02:615.285.7

#### STUDY OF SKIN IRRITATING AND SENSITIZING ACTION OF PESTICIDE ACETOCHLOR

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received 13 Dec 83) pp 85-86

GALADINA, I. D. and ZAYTSEVA, Ye. P., Moscow Scientific Research Institute of Hygiene imeni F. F. Erisman

[Abstract] Pesticide use in agriculture leads to contamination of food products, water, soil, etc. Pesticides may cause contact dermatoses and allergic skin diseases. The effect of acetochlor pesticide was investigated on guinea pigs. The experimental results showed that upon epicutaneous administration, acetochlor showed some irritating effect but no sensitizing action. Penetrating through the skin, it caused massive degranulation of large cells. Acetochlor intensified proliferative processes, exhibiting its irritating action. Figure 1; references 9 (Russian).  
[1552-7813]

UDC 616.89-092(049.8)

#### INVOLVEMENT OF NEUROPEPTIDES IN ETIOLOGY, PATHOGENESIS AND CLINICAL MANIFESTATIONS OF MENTAL ILLNESS

Moscow SOVETSKAYA MEDITSINA in Russian No 6, Jun 84 (manuscript received 21 Sep 82) pp 50-53

BAKHAREV, V.D. and TIKHOMIROV, S. M., Leningrad

[Abstract] Largely Western literature is reviewed on the putative relationship between alterations in neuropeptide levels and various forms of mental illness. Observation of humans are presented and correlated with neurochemical studies, while, in animals, induced biochemical lesions show correlation with altered behavior patterns. A number of clinical observations have received experimental confirmation, such as the relationship between hypothyroidism and depression. At the present time most researchers feel that a definite relationship prevails between neuropeptide levels and their neuropsychopharmacologic manifestations. It has also been proposed that

while biochemical derangement may underlie various forms of mental disorders, both in the etiological and pathogenetic sense, congeners of the neuropeptides are quite likely to be therapeutically useful. References 52: 7 Russian, 45 Western.  
[1543-12172]

UDC: 616.98:578.8]-085.281.8

#### NONTRADITIONAL APPROACHES TO VIRAL INFECTION CHEMOTHERAPY

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 pp 373-375

UNSIGNED

[Abstract] Three groups of antiviral substances have been found as a result of many years of work performed in a number of laboratories: thiosemicarbazones, adamantamine derivatives and anomalous nucleosides. Anomalous nucleosides have a potentially broad spectrum of antiviral action but are toxic, having a therapeutic effect only for herpes. Interferon reveals a nontraditional approach to the development of new chemotherapeutic compounds. The target of the chemotherapeutic action in nontraditional chemotherapy is intracellular virus-specific processes critically important for the development of infection and unique to viruses of various taxonomic groups. The distinguishing feature of nontraditional approaches is the synthesis or search for chemical substances based on a detailed knowledge of the essence of the molecular processes occurring in the most vulnerable stages of viral reproduction. Such approaches as killing of infected cells and damaging of viral genes can lead to the development of new chemotherapeutic substances.  
[1599-6508]

UDC: 57:[658.516+389.151

#### BIOLOGICAL STANDARDIZATION

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 1 Jun 83) pp 264-270

DZAGUROV, S. G. and BYCHENKO, B. D., State Scientific Research Institute of Standardization and Testing of Medical Biological Preparations imeni L. A. Tarasevich, USSR Ministry of Health, Moscow

[Abstract] A new scientific area entitled Biological Standardization or Biostandardization has arisen at the junction of biology and standardization. The need to standardize biological preparations arose in connection with the rapid growth of the production and export of these products. Since 1973, problems of standardization of diagnostic biological preparations have been studied by the Department of Technology, Laboratory of Public



Health, Section of Prophylactic, Diagnostic and Therapeutic Substances of WHO. Biostandardization has now accumulated a great deal of specific knowledge concerning quality control of prophylactic, therapeutic and diagnostic biological preparations. The creation of standards for biological preparations must be considered a scientific work, whose results greatly influence the quality of products produced by the biological industry. The goals and objects of biological standardization are discussed. The most important tasks of biostandardization are systematization and theoretical summarization of accumulated knowledge; creation of the dictionary of terms on biostandardization; classification of biological preparations; study and classification of causes and factors of variability in the quality of biological preparations; simplification and standardization of existing methods of quality control; development of new and improvement of existing methods of testing raw materials and finished products; development and further improvement of standard specimens for major preparations; development of advanced and combined standards; improvement of systems of standardization of biological preparations by development of leading and base standardization organs and the creation of branch plans for biological standardization; and increasing the effectiveness of the state supervision service as well as studying the economic effectiveness of biological standardization and legal aspects of biostandardization. References 9: 4 Russian, 5 Western.  
[1599-6508]

UDC: 615.281.8.015.4.07

#### ANTIVIRAL ACTIVITY OF CHELIDAMIC ACID DERIVATIVES

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 28 Dec 82) pp 361-363

YAVOROVSKAYA, V. Ye., IL'YENKO, V. I., TYURENKOVA, G. N., SEREBRYAKOVA, N.V., YEVSSTROPOV, A. N. and KISELEVA, V. N., Novosibirsk Medical Institute, USSR Ministry of Health; Urals Polytechnic Institute imeni S. M. Kirov, Sverlovsk

[Abstract] A study is presented of the antiviral properties of chelidamic acid and a number of its derivatives synthesized at Urals Polytechnical Institute. Substances with the common formula 4-oxopyridine-2,6-dicarboxylic acid were used. The antiviral activity of the compounds was determined in a culture of primarily trypsinized human embryo fibroblasts. Antiviral activity was determined by the ability of the compounds to retard reproduction of Indiana vesicular stomatitis, Coxsackie A13 and Coxsackie A18 as well as 23 adenoviruses. Chelidamic acid at 250 µg/ml retards reproduction of vesicular stomatitis virus, has no influence on the reproduction of the other test viruses and does not induce interferon formation. Chelidamic acid had an anti-influenza effect in developing chick embryos, protective index 80%. The dihydrazide had no influence on reproduction of influenza virus, while the dihydrazide of 4-alkoxychelidamic acid did have anti-influenza activity in vivo but was highly toxic for animals. References 5: 3 Russian, 2 Western.  
[1599-6508]

## PHYSIOLOGY

### RECOMMENDATIONS FOR MEDICAL CARE UNDER ANTARCTIC CONDITIONS

Frunze SOVETSKAYA KIRGIZIYA in Russian 14 Oct 84 p. 8

[Article by V. Dneprov]

[Text] Scientific and methodological recommendations have been prepared for organizing and rendering medical care in conditions of the interior of the Antarctic continent. These recommendations are the result of creative collaboration between associates of the Arctic and Antarctic Institute of the USSR Council of Ministers' State Committee on Hydrometeorology and Monitoring of the Natural Environment, and the Kirgiz Academy of Sciences' Institute of the Physiology and Experimental Pathology of High Attitudes.

M.M. Mirrakhimov, corresponding member of the USSR Academy of Medical Sciences, doctors of medical sciences A. A. Aydaraliyev and I. F. Ryabinin, and Candidate of Medical Sciences A. L. Maksimov, who have spent winters on the Antarctic continent, and other scientists of Kirgizia took part in drafting the recommendations. These scientists have shed light on aspects of medical practice in the development of high-elevation pathology in the conditions of Antarctica, as well as on other questions.

As is known, scientists of Kirgizia have proposed a method for forecasting human working fitness in extreme conditions. This method was thoroughly tested in the severe conditions of the mountain climate of the Tyan'-Shan' range, the hot deserts of Turkmenia, the area along the Baykal-Amur Railroad route, and in Antarctica, which is renowned for its high elevations and very low temperatures. The USSR Ministry of Health has adopted this method for use in extreme zones all over our country. The scientists' new developments will make it possible to screen people correctly for work in Antarctica, to render medical care more successfully to members of winter contingents who have become ill, and to take special measures to protect people against the effects of extreme environments.

FTD/SNAP  
CSO: 1840/064

UDC 616.831.258-092:616.831-008.6:577.175.82

LATERALIZATION OF PEPTIDE DISTRIBUTION IN BRAIN AND MOTOR CONTROL ASYMMETRY

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in  
Russian No 3, May-Jun 84 (manuscript received 19 Oct 83) pp 68-71

KRYZHANOVSKIY, G. N., LUTSENKO, V. K., KARGANOV, M. Yu. and BELYAYEV, S. V.,  
Institute of General Pathology and Pathological Physiology, USSR Academy  
of Medical Sciences, Moscow

[Abstract] Asymmetry in the activity of lateral vestibular Deiters' nuclei was produced in albino rats by administration of two minimum lethal doses of tetanus toxoid into left or right nucleus. Low-molecular-weight substances were subsequently extracted from the brain of "donor" rats and purified; these extracts were then administered to recipient animals. Changes in muscle tone were elicited in recipient animals, which were of the same type (extension of hind leg) and on the same side as in donors, but rolling-over behavior was not elicited. Similar results were obtained with use of extracts from the left and right hemispheres of untreated donors and bovine brains. Study of the effect of extracts from the right hemisphere on pain sensitivity produced no conclusive evidence. The active fraction from the right hemisphere of the bovine brain was found to have a hypothermal effect. Administration of extracts from left or right hemisphere of rats to the dorsal surface of lumbar segments or Th<sub>5</sub>-Th<sub>7</sub> produced asymmetric changes corresponding to the source of the extract. Chemical analysis of bovine brain extracts revealed the presence of a substance with a molecular weight of 1-2 kilodaltons; a substance with a molecular weight of 1 kilodalton was isolated from brain extracts from rats with vestibulopathy. Further purification (chromatography) indicated that there were at least two components of different molecular weight capable of eliciting the left-sided effect and two components of similar molecular weight the right-sided effect. The active component of these fractions was sensitive to proteolysis and competition by an opiate antagonist. Preincubation of active fractions with pronase or preliminary administration of nalorphine totally eliminated the extension effects of the fractions. Figures 1; references 12: 9 Russian, 3 Western.

[1521-9307]

## PUBLIC HEALTH

### RESORTS < SANATORIA PRAISED AS COST-SAVING ALTERNATIVE CARE

[Editorial Report] Alma-Ata SOTSIALISTIK QAZAQSTAN in Kazakh 14 July 84 carries on page 2 a 1,900-word article by Q. Boqayev on the need to develop more resorts and sanatoria in the KaSSR to take advantage of abundant medicinal waters and clays and reduce primary and secondary health care costs. The article is published under the regular rubric "Problems, Thoughts, Suggestions."

The Party, Boqayev begins, has been greatly concerned about the health of the Soviet people; their health and physical well-being are maintained at high levels, backed by a well-equipped, modern and well-staffed public health system. In the KaSSR, this system includes some 4,000 facilities with 3.52 physicians per 1,000 inhabitants and 10.81 other medical workers, the republic standing sixth in the Soviet Union in this regard.

One current force, Boqayev continues, of the current Soviet health care effort is preventive care and cost reduction. Resorts and sanatoria, he goes on, have been shown to have great potential usefulness in both areas since they can help raise health levels for many and can serve as an alternative health care system to reduce the load on expensive hospital, dispensary and other similar regular health care facilities.

Today in the KaSSR, Boqayev continues, there are, not counting tuberculosis sanatoria, 20 convalescent facilities (i.e. resorts and sanatoria) of every sort, with 10,000 or so places, and 4,000 places in rest homes. Since an estimated 342,000 persons a year need to use these facilities (273,000 for the sanatoria alone), the 20 or so convalescent facilities, Boqayev goes on, are clearly inadequate in terms of the demand. Why?, he asks, is the system so underdeveloped, with the wealth (more than 500) of available hot springs and other cure sites (including 105 with medicinal clays) in the republic and the great need that is only too apparent (he notes, for example, use of one spring by up to 700 persons privately, with no official organization, and the "unpleasant incidents" that have sometimes resulted from such things)?

Seeking an answer, Boqayev goes on to survey sites and complex sites (some 50) where resorts or sanatoria might be established, paying attention to potential local demand, ease of development, transportation, etc. He stresses, moreover, the great benefits to be obtained from Kazakh medicinal waters or clays, that contain medicinal substances not found elsewhere or in higher concentrations. He complains strenuously of failure to use even the funds available, much less invest more, to make these major medicinal resources better available.

UDC: 616-036.86-07

METHODOLOGIC APPROACHES TO EVALUATION OF SOCIAL-ECONOMIC ASPECTS OF  
TEMPORARY LOSS OF WORKING CAPACITY

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 8, Aug 84  
(manuscript received 23 Nov 83) pp 17-20

SHAKHGEL'DYANTS, A. Ye., All-Union Scientific Research Institute of Social  
Hygiene and Organization of Public Health imeni N. A. Semashko, USSR Ministry  
of Health

[Abstract] A review is presented of equations which have been suggested to  
calculate the cost of temporary losses of working capacity. Previous investi-  
gators have erred by calculating the cost of total production rather than the  
more correct consideration only of newly imposed costs resulting from lost  
working time, and by attempting to prove the variation in productivity of  
labor as a function of a decrease or increase in morbidity rather than com-  
puting the actual loss incurred or avoided. Equations are presented for these  
improved methods of calculation.  
[871-6508]

UDC: 616.89-008.441.13-036.12

EARLY DIAGNOSIS OF CHRONIC ALCOHOLISM

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 8, Aug 84  
(manuscript received 23 Sep 83) pp 23-26

BEKHTEL', Z. Ye., Narcologic Hospital No. 17, Moscow

[Abstract] In spite of the difficulty, differentiation between social  
drinking and incipient alcoholism is a necessity. The major criterion for  
defining disease in narcology as in medicine as a whole is the symptomatic  
criterion--diagnosis based on observation of symptoms of the disease. Intro-  
duction of new methods of investigation, however, shifts the boundaries of  
disease when the symptomatic approach is used. The functional approach is  
thus preferable to the symptomatic for determining the boundary of disease.  
One can be said to be a chronic alcoholic only when misuse of alcohol has

led to alteration of the functioning of the body. There are at present no criteria for precise diagnosis of alcoholism in its early stages. This is possible only upon appearance of the alcohol abstinence syndrome. At the individual psychological level the major criterion of disease is development of painful drunkenness. Other factors such as psychological dependence on alcohol must be considered precursors of the disease. Thus, upon transition from the symptomatic to the functional criterion the most reliable early manifestations of the disease are signs of social dysadaptation such as loss of working capacity, violation of social rules and problems with interrelationships in the family. References 16: 15 Russian, 1 Western.  
[871-6508]

UDC: 616-056.265-057:621

#### INFLUENCE OF PRODUCTION-OCCUPATIONAL FACTORS ON LOST TIME MORBIDITY

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 8, Aug 84  
(manuscript received 25 Jul 83) pp 32-34

SHAROVA, A. N., KRUCHININA, R. I. and SHAROV, G. I., Krasnoyarsk Medical Institute

[Abstract] A study is presented of lost time morbidity of workers in the major sections of a heavy machine building enterprise. Lost time morbidity was studied on the basis of official documents filled out by the enterprise in 1979-1981. The major causes of lost time were colds and bronchitis, followed by "other diseases", domestic injuries, diseases of the nerves and peripheral ganglia, and infections of the skin. Various somatic diseases such as ulcers, hypertension, rheumatism, heart disease, liver and kidney disease represented 0.5 to 1.5% of cases of lost time. The level of overall morbidity and the specific share of respiratory disease at this enterprise did not exceed the figures for other heavy machine building enterprises in other climatic regions. However, an effort should be expended to reduce chronic nonspecific pulmonary disease morbidity.  
[871-6508]

UDC: 614.2(574)

#### PUBLIC HEALTH IN VIRGIN LANDS OF KAZAKHSTAN

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 7, Jul 84

ALIYEV, M. A., minister of Health, Kazakh SSR

[Abstract] The rapid expansion of population in the virgin lands has required rapid development of the social infrastructure including public health. Particular difficulties arose in the organization of medical assistance to

people arriving at new state farms. Their great remoteness, the absence of roads, communications and the shortage of buildings created problems which were solved on site. The history of public health in the virgin lands is sketched with a broad brush, beginning with the tremendous input of medical personnel and equipment in 1953 and continuing through the development of ambulatory-polyclinic services in the 1970's. Particular problems were found in the provision of potable water. Great work has been done in reducing infant mortality, expanding the network of pharmacies and providing ambulatory services. A great deal has been done in general to improve medical services in the virgin lands, but much more remains to be done. No details are given.

[854-6508]

UDC: 614.1:313.13(574-22)

#### SPECIFICS OF MORBIDITY OF AGRICULTURAL POPULATION IN VIRGIN LANDS

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 7, Jul 84 (manuscript received 10 Feb 84) pp 6-9

PETROV, P. P. and ABENOV, Kh. K., Scientific Research Institute of Regional Pathology, Kazakh Ministry of Health, Alma-Ata

[Abstract] The development of state farms and machine tractor stations in the virgin lands of Kazakhstan where none existed previously required special strategy and tactics in the organization of the network of therapeutic and prophylactic public health institutions. In 1981, morbidity of Kiyminskiy Rayon, Turgayskiy Oblast was studied. There was 711.5 medical visits per 1000 residents in 1981. In Makhamvedskiy rayon, Gur'yev Oblast this figure was 863.6, in Violodarskiy Rayon - 968.5. In Tselinograd Rayon - 1030.9, in Gelubokovskiy Rayon - 1040.3, in Tul'kubasskiy Rayon - 1176.2. Figures for children indicated maximum morbidity among 2 year olds. Diseases of the organs of respiration were the greatest cause of visits to the physician, infectious and parasitic diseases next, followed by circulatory system diseases, nervous system and sensory organ diseases, diseases of the skin and subcutaneous tissue and digestive diseases. Chronic diseases required 678.2 visits per 1000 population. References 2 (Russian).

[854-6508]

## FACTORS DETERMINING PARTICIPATION OF MINSK POPULATION IN PROPHYLACTIC EXAMINATIONS

Moscow GIGIYENA I SANITARIYA in Russian No 8, Aug 84 (manuscript received 30 Jan 84) pp 48-50

ZBOROVSKIY, E. I., FOMINA, R. F., OREKHOV, N. I., AVRAMENKO, T. V., APANASEVICH, V. V., GRAKOVICH, A. A., KOZLOV, I. D. and LAPOTKO, Yu. N., Belorussian Scientific Research Institute of Cardiology, Minsk

[Abstract] Because of the difficulties encountered usually in epidemiological studies (30% refusal of initial examination, considerable loss in continuous follow up), the willingness of participating screenees in a multifactorial prophylactic study of ischemic heart disease was investigated on a random 40-59 year old male population from Minsk. Of the 6000 targeted individuals only 4149 (69.2%) replied to the first notification. Of the non-conformers only 8% had an objective reason for non-participation beyond their control (moved away, were sick, or deceased). Majority (62.6%) indicated no reason for refusing the screening; 6.5% agreed to it but did not show up. Only 8.7% indicated why they refused to participate: 56% due to lack of time, 27% because of negative attitude to medical examinations in general. Of the remainder, 13% were regularly examined by their physicians and 4% were believed to be perfectly healthy. Overall, the data supported other, previously-reported experience that subjective evaluation of illnesses has a definite influence on decision making with regards to screening participation. References 16 (Russian). [1552-7813]

## PROBLEMS OF STUDENT MARRIAGES

Moscow MEDITSINAKAYA GAZETA in Russian 12 Oct 84 p 4

FROLOV, A., assistant, Chair of Social Hygiene and Public Health Administration, Tomsk Medical Institute and BALAKIN, G., MEDITSINSKAYA GAZETA correspondent, Tomsk-Novosibirsk

[Abstract] The problem of living quarters for married students is discussed on the basis of current practices at the Novosibirsk and Alma-Ata medical institutes, and on the basis of the various practices at the higher educational establishments in Tomsk. In Novosibirsk and Alma-Ata, the medical institute administrators have shown concern and understanding for married medical students, and have made provisions for married housing. In most other situations, including Tomsk, the problem of married student housing is neglected and such students have to live separately in general dormitory facilities. An exception in Tomsk is the polytechnic institute, because of the understanding and interest displayed by I.P. Chuchalin, rector of that institute. His strong support and encouragement of married students is,



apparently, not shared at the other institutions of higher learning in that city. Yet the problem is a crucial one, and it bears remembering that the family unit is the cornerstone of the entire society.  
[1564-12172]

#### IMPROVEMENTS IN HEALTH CARE DELIVERY

Riga SOVETSKAYA LATVIYA in Russian 25 Oct 84 p 4

[Abstract] The opening of the first meeting of social hygienists, health administrators and historians of medicine of the Latvian SSR was commented upon by Professor V. V. Kanep, Minister of Health, Latvian SSR, and Academician of the USSR Academy of Medical Sciences. The agenda of the meeting will involve discussion of a number of current problems in health delivery and medical history, and will involve the participation of leading scientists and clinicians from the other Soviet republics. Latvian physicians pioneered the application of computer technology to medicine and, as a result of the greater efficiency and economies that this introduced into the medical services, it is now possible to treat an additional 10,000 individuals on an in-patient basis. Computers have also made possible an efficient mass screening program in Latvia that has been the object of emulation in other republics, and in the formulation of reliable long-term morbidity predictions.  
[057-12172]

#### MEDICAL SERVICES IN DAGHESTAN

Moscow IZVESTIYA in Russian 9 Oct 84 p 3

KAZIKHANOV, A., IZVESTIYA correspondent, Daghestan ASSR

[Abstract] A visitor to the larger cities in Daghestan cannot help but be impressed by the modern, well-equipped and fully-staffed hospitals and polyclinics. Equally impressive are the various other health services and ambulatory facilities. However, when one visits a rural area an entirely different scene presents itself on the medical horizon. Invariably, in the villages and small settlements, the highly motivated physicians and nurses have to contend with old and dilapidated structures that serve as hospitals or clinics, and were originally intended for other purposes. More often than not, running water and central heating are luxuries that escape the local medical facilities, and, often, the physicians and nurses themselves are involved in repair and construction of these facilities. Regulations are in force that call for 138 hospital beds per 10,000 population in the RSFSR, but in Daghestan the figure barely stands at 109 beds. No satisfactory response has yet been obtained from the Daghestan ASSR Ministry of Health, yet the problem is acute and demands immediate attention and rectification.  
[056-12172]

## IMPROVING MEDICAL EMERGENCY SERVICES IN BREST

Moscow SEL'SKAYA GAZETA in Russian 11 Nov 84 p 2

[Abstract] In response to the critical article about emergency medical services in Brest, which appeared in the 9 Aug 84 issue of SEL'SKAYA GAZETA, the Belorussian SSR Ministry of Health has taken decisive steps to improve the situation. Repairs have been made at the dispatching radiocenter and the telecommunication network is now fully functional; other equipment, such as the electrocardiograph, have also been put into working order. In all, 53 additional ambulances have been assigned to the Brest Oblast, and the fuel supply has been increased by 27 tons. Meetings have been held by the local health authorities to discuss and resolve the existing problems. Finally, additional medical personnel will be assigned to complement the present staff.

[032-12172]

UDC 614.27+615.12]([47+57]-22):008

## IMPROVING RURAL PHARMACEUTICAL SERVICE

Moscow FARMATSIYA in Russian Vol 33, No 5, Sep-Oct 84 pp 1-5

UZDENIKOV, A.N., GAPU [expansion unknown, Main Pharmacy Administration?]  
USSR Ministry of Health, Moscow

[Abstract] In accordance with the directives of the 26th Party Plenum, considerable advances have been made in improving rural pharmaceutical services. In particular, the Central Rayon Pharmacies have been markedly improved by staffing them with highly qualified pharmacists and expanding their variety and supply of drugs. The number of rural pharmacies is increasing by an average of 120 a year, and the total number currently stands at 12,700; this number represents approximately 50% of all the pharmacies in the USSR. In the rural areas one pharmacy now serves 7,700 people (versus a planned for ratio of one per 7,000). However, there are marked regional discrepancies in these figures. For example, the figure is one pharmacy per 4,200 rural residents in Estonia, 4,500 in Latvia, 12,900 in Azerbaijan, 14,300 in Tajikistan, and 13,600 in Turkmenia. Poor regulatory mechanisms also account for glaring inconsistencies in pharmaceutical expenditures per rural resident, ranging from 90 kopecks in Armenia, 1 r. 10 kp. in Azerbaijan, 1 r. 97 kp. in Georgia, 1 r. 74 kp. in Tajikistan, to 4 r. 52 kp. in Belorussia, 4 r. 85 kp. in Estonia, 6 r. 02 kp. in Latvia and 6 r. 03 kp. in RSFSR. Staff quality and educational preparation also varies broadly and differs from urban areas. In urban areas there are, on the average, 9 pharmacists-specialists per 10,000 population, whereas in rural areas this figure is on the average three-fold lower. In Turkmenia the corresponding figure is 0.99, in Azerbaijan 1, in Tajikistan 1.15, in Armenia 1.68, and in Georgia 2.61. The latter figures represent numerical values that are 6 to 8-fold lower than the urban figures for those areas. It is evident that there is considerable room for further improvement in the rural pharmaceutical services in the USSR.

[1542-12172]

#### BRIEFS

NEW UZBEK HOSPITAL -- A group of experts and representatives from a number of Hungarian firms which manufacture medical instruments and equipment has arrived in Uzbekistan. In accordance with an agreement for cooperation in the field of health services and medical science, they will concern themselves with the installment of equipment in the new hospital of the Tashkent Medical Institute. This new hospital has 2,100 beds and, as such, is the largest in the Soviet Union. Firms in the GDR, Czechoslovakia, and Yugoslavia are also supplying technological aid in the medical field to the hospital. The Tashkent Medical Institute is training medical cadres for friendly socialist countries. [Text] [Tashkent International Service in Uzbek 1700 GMT 11 Nov 84 GF]

CSO: 1840/129

PSYCHOLOGY

PSYCHOLOGY FACULTY, MOSCOW STATE UNIVERSITY

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA SURUIYA 14 PSIKHOLOGIYA in Russian  
No 3, Jul-Sep 84 pp 51-55

[Abstract] Sof'ya Nilolayevna Karpov, scientific secretary of the administrative council of the department, and Yelena Yur'yevna Artem'yeva, curator of the Scientific Student Society describe some aspects of organization of work and activities under way in the faculty. Karpov describes the work of six councils functioning in 1983, including two specialized councils on awarding candidate of psychological sciences degrees, one specialized council on awarding candidate of pedagogical sciences degree, two specialized councils on the defense of dissertation for students seeking the Doctor of Psychological Sciences degree and a so-called "administrative" or "petty" council, serving as a consultative organ for the dean of the faculty, which council considers rules for awarding scholarly titles and considers problems related to instruction, methodological, competition, economic and other problems. Ye. Yu. Artem'yeva discusses some aspects of special programs and schools concerning problems of psychology, which courses have been presented in the faculty since 1967. She describes types of courses offered, structure, subject matter of courses and other aspects of this program  
[024-2791]

## VETERINARY MEDICINE

### NEW ACIDOPHILUS MILK CONCENTRATE

Yerevan KOMMUNIST in Russian 25 Aug 84 p 4

[Article by V. Sarkisyan: "All-Powerful Concentrate"]

[Text] A manufacturing process for producing concentrates for effective use in the production of dairy products and in animal husbandry has been developed at the Yerevan Veterinary Institute by means of cultivating specially selected lactobacilli.

Ruben Kurdoyan, an associate in the Institute's Dairy Products Department, has obtained a concentrate in which 1 gram contains more than 800 billion live and active lactobacilli cells. This figure is particularly impressive if one compares it to the figure of 50-100 billion cells which was the cell saturation point obtained in the old process. For example, in the process of making sour milk, 50 liters of an enzyme fermenting material are usually mixed with 1 ton of milk, whereas only 5 grams of the concentrate are needed for the same process. The concentrate not only saves on the use of enzyme but also improves the quality of the end product.

"Kurdoyan's process will be broadly utilized in cheese-making," said Department Head, Doctor of Technical Sciences, Professor Zaven Khristoforovich Dilanyan. "We have successfully tested the introduction of the concentrate in the form of a liquid enzyme fermenting material directly into the cheese granule that is ready for molding. Consequently, 3 tons of first quality Soviet cheese has been produced at the cheese plants of the Altay Association. Five tons each of Holland and Kostrom cheese, also of the highest quality, were produced at the Mallik Butter and Cheese Plant of the Riga Dairy Combine. Another important fact is that the cheese ages significantly faster, i.e., in 30 days instead of 75. The economic benefits derived from the cheese's better quality alone came to over 30 rubles per ton of product."

The laboratory is well lit and sterile-clean. We went up to one of the tables together with the process's developer. Kurdoyan pointed out a number of beakers and test tubes filled with a white mass. He poured a little into a small vial and offered it to us to try it. Without hesitating too long, I agreed. The white viscous liquid that smelled like sour milk and looked like sour cream turned out to have a pleasant taste, something like sour

cream with sugar. It is interesting that the preparation can be kept at freezing temperatures in the freezer of any domestic refrigerator for as long as a year. Before using the product, one dilutes it with a little water or milk.

This all-powerful concentrate can also be used for treating gastrointestinal illnesses, particularly dyspepsia in new-born and young agricultural animals. Just 1 gram of the liquid acidophilus concentrate (ZhAKa) will bring about the animal's recovery within a few days. The preparation has been tested at livestock farms in kolkhozes in the villages of the Shvanidzor Merginskiy, Davidashen Shaumyanskiy, Ovtashen Masisskiy, Podr Vedi Araratskiy, Kapytan Abovyanskiy rayons, and in the Echmiadzinskoye Swine-Breeding Farm. Whereas epizootic cattle disease with dyspepsia reached a level of 25 percent in these farms in previous periods, that level was brought down to a minimum since the use of the concentrate. The testing was conducted in a total of 12 kolkhozes, and the preparation's effectiveness was noted in all of them.

Many bacteria play an important role in human health. It is no accident that I. Mechnikov, in his formula to control premature ageing, recommended the systematic use of sour milk with just these bacterial strains.

"The actual commercial introduction of ZhAKa is now in the stage of becoming officially approved in the republic's ministries of agriculture and meat and dairy industry," said R. Kurdoyan. "The laboratory is not in a position to set up the production of the concentrate in the quantity that is required. We need a biological factory. We have the space for it at the institute, but there is still the problem of acquiring equipment...."

It seems that the time will come when the process developed at the Veterinary Institute's Dairy Department will be given a lease on life.

6289

CSO: 1840/1001

UDC: 578.832.1:578.53].083.3

IMMUNOGENIC PROPERTIES OF EPIDEMIC AND RECOMBINANT STRAINS OF H1N1 AND H3N2 INFLUENZA VIRUSES

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 15 Aug 83) pp 273-276

SHCHIPANOVA, M. V., PODCHERNYAYEVA, R. Ya. and BLINOVA, V. K., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] Results are presented from a study of the immunogenic properties of epidemic strains of H1N1 and H3N2 influenza viruses isolated from patients in 1979-1982 and obtained by crossing with laboratory strain A/PR8/34 of their recombinants. The first series of recombination experiments produced four recombinants with the antigenic properties of strain A/USSR/012/79, and as a result of the crossing A/PR8/34 x A/Texas/29/82, two recombinants were selected with the antigenic properties of strain A/Texas/29/82. The results indicated that the H1N1 virus has weaker immunogenic properties than the H3N2 virus. Recombinants of both types are immunogenically more active than the initial strains but differ in the intensity of immunity, which in turn does not correlate with the antibody titers. Further studies of immunity with respect to antigen-closer or even homologous pathogenic viruses are needed. Figures 2; references 5 (Russian).  
[1599-6508]

CHRONIC MACHUPO VIRUS INFECTION IN BHK-21 CELLS. DEVELOPMENT OF SYSTEM AND SOME PROPERTIES OF VIRUS PRODUCED BY CELLS OF THIS LINE

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 19 Sep 83) pp 312-316

TROFIMOV, N. M., PETKEVICH, A. S., YEROFEYEVA, N. I., FIDAROV, F. M., MOROZ, A. G. and VOTYAKOV, V. I., Belorussian Scientific Research Institute of Epidemiology and Microbiology, Minsk

[Abstract] A study is presented of chronic infection of BHK-21 cells with Machupo virus. Some of the properties of the virus produced by the cells of this line are studied. A line of BHK-21 cells chronically infected with Machupo virus was obtained, which had been through 32 passages over 126 days at the time the article was written. After 72 hours cultivation, the number of infected cells was 12 to 16%. The BHK-21 cells had resistance to superinfection by a homologous virus. The Machupo virus produced by the cells differed from the standard virus in the nature of spot formation in an agar Vero cell culture, producing smaller spots later. After 72 hours cultivation at 39°C there was a reliable decrease in the titer in comparison to the titer at 33°C. Future studies will cover cell factors facilitating maintenance of the persistent virus and will study the properties of the virus produced by the cells of the system in detail. Figures 2; references 17: 8 Russian, 9 Western (1 by Russian author). [1599-6508]

ANALYSIS OF GENOME OF BUNYAVIRUS RECOMBINANTS BY PINPOINT HYBRIDIZATION

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 22 Sep 83) pp 301-309

PRINGLE, C. R., CLARK, W., LEE, J. F. and ELLIOTT, R.M., Institute of Virology Glasgow, Great Britain

[Abstract] A simple, rapid method is described for determining the genome type of recombinants, suitable for analysis of large numbers of samples. The use of the method demonstrated satisfactory segregation of two out of three genome fragments in heterologous crossing of batii, bunyamwera and maguari viruses as freely recombining representatives of the bunyamwera serotype. Direct analysis of bunyavirus RNA sequences showed that the terminal nucleotides in three genome subunits are preserved and demonstrate partial inverted complementarity. These conservative sequences are probably genus specific. The method of pinpoint (dot) hybridization is demonstrated to be quick and reliable for determination of the genome type of progeny obtained by crossing of the bunyamwera and other representatives of the bunyavirus genus. The



lack of a probe specific for the M RNA subunit is compensated by the capability to differentiate the proposed production of the M gene by electrophoresis of proteins in polyacrylamide gel. Pinpoint hybridization is the method which can be used in other experiments involving clones of a single gene in a group of related viruses, as in crossing of rotaviruses obtained from different hosts. The data of this article indicate that limited sorting occurs at the gene specific level. One unforeseen result of the limited redistribution is that it is still impossible to achieve transmission of genes for the three recombinants of the maguari virus group. Figures 3; references: 23 Western.  
[1599-6508]

UDC: 578.833.1:578.53

#### INFLUENCE OF PASSAGE METHOD ON BIOLOGICAL PROPERTIES OF ATTENUATED ALPHAVIRUS STRAINS

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 29 Sep 83) pp 294-301

TSILINSKIY, Ya. Ya., PRIYANICHNIKOVA, L. V., KARPOVA, Ye. F. and SHABLINSKAYA, L. M., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] A comparative study of the influence of "dilute" and "undilute" passages on the biological properties of Venezulean and Eastern equine encephalomyelitis viruses was performed. It was shown that undiluted passages regularly lead to changes in spot phenotype and an increase in the biological activity of the attenuated virus. The phenomenon is described and the role of genetic interaction involving defective viruses in its occurrence is studied. With passage by inoculation with small doses, the virus retained its initial, low level of biological activity. Undilute passages resulted in genetic transformation of the population and an increase in the biological activity of the virus. Variants with altered phenotype and elevated reproductive potential were accumulated. These viruses were often more virulent than the initial virus. It was found that an analogous virus can be obtained in an earlier passage by infection of cells with aggregate virions. The change in properties of the virus upon infection with aggregate virions is related to the presence in the population of the DI particles which, when present, give the virus the capability of variation. The presence of the defective virus thus gives a cloned virus population genetic heterogeneity. Figures 2; references 10: 6 Russian, 4 Western.  
[1599-6508]

## SUSCEPTIBILITY OF LABORATORY ANIMALS TO THE CHANDIPURA AND ISFAHAN VIRUSES

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 18 Jul 83) pp 290-924

SOKKHEY, Ch. and OBUKHOVA, V. R., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] The Chandipura and Isfahan viruses are rabdoviruses of the genus Vesiculovirus. They have been isolated in the Old World countries and the primary carrier is the mosquito. This article presents the study of the pathogenic and immunogenic properties of the Chandipura virus from India and Isfahan virus from Iran for mice and guinea pigs. White mice of various ages were infected intracerebrally, subcutaneously and intraperitoneally. Mature mice were also infected in the pad of the rear paw. Guinea pigs were infected only subcutaneously in the paw. Both viruses were highly pathogenic for young white mice. The Chandipura virus was more pathogenic for mice of all ages than the Isfahan virus. Antibodies to Chandipura virus were accumulated in high titers within two weeks after infection, the titer sometimes decreasing after 4 weeks. The phenomenon of edema of the paw in guinea pigs was observed after subcutaneously administration of both the viruses. References 12: 6 Russian, 6 Western.  
[1599-6508]

UDC: 616.98:578.832.1]-036.2(470.23)"1983"

## SPECIFICS OF PATHOGEN OF INFLUENZA A EPIDEMIC (H3N2) IN LENINGRAD IN 1983

Moscow VOPROSY VIRUSOLOGII in Russian Vol 29, No 3, May-Jun 84 (manuscript received 12 Oct 83) pp 286-290

IVANOVA, N. A., KUDRYAVTSEVA, V. K., NEVEDOMSKAYA, G. N., KRAMSKAYA, T. A., TAROS, L. Yu. and SMORODINTSEV, A. A., Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad

[Abstract] An analysis is presented of the antigenic and biological properties of the pathogens of the influenza H3N2 epidemic which occurred in Leningrad in February of 1983. Virologic studies were performed on 84 juvenile patients from 12 influenza foci among young school age children. The viruses taken from upper respiratory secretions were compared with specimens from the world influenza center in Atlanta. 31 strains of A(H3N2) influenza virus were isolated from the specimens. The 1983 influenza epidemic pathogens had moderate reproductive activity in chick embryos. One distinguishing property of these pathogens was their weak ability to reproduce in the lungs of white mice. The newly isolated strains retained their sensitivity to laboratory animal serum gamma inhibitors characteristic of the H3N2 sero type virus. Also characteristic of this epidemic was the

antigenic heterogeneity of its pathogens. Predominant was A/Bangkok/1/79, but A/Bangkok/2/79 and A/Philippines/2/82 were also present. The A/Philippines/2/82 virus produced antibodies demonstrating a broad spectrum of immunity, indicating that this strain may be a suitable candidate for the production of vaccines. References 5: 1 Russian, 4 Western.  
[1599-6508]

UDC 578.2

NUCLEOTIDE SEQUENCE OF INFLUENZA VIRUS A/UDORN/307/72 (H3N2) HEMAGGLUTININ GENE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 278, No 3, Sep 84 (manuscript received 5 Jun 84) pp 738-742

YUFEROV, V.P., KARGINOV, V. A., SAMOKHVALOV, Ye.I., CHIZHIKOV, V.Ye., VASILENKO, S. K., URYVAYEV, L. V. and ZHDANOV V. M., academician, USSR Academy of Medical Sciences, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow; All-Union Scientific Research Institute of Molecular Biology, Kol'tsovo, Novosibirsk Oblast

[Abstract] Standard techniques of molecular virology were used to synthesize, clone and determine the primary structure of a full DNA copy of the hemagglutinin gene of influenza virus A/Udorn/307/72 (H3N2). Data on the nucleotide sequence and corresponding amino acids are summarized in tabular form, and compared with data for the analogous gene in influenza virus A/Memphis/102/72. The comparison revealed 8 nucleotide substitutions. Changes in the subunit HA1 at nucleotide positions 28, 38, 429, 572 and 851 did not result in amino acid substitutions. Substitution at position 442 led to the appearance of serine in position 122 (instead of asparagine) of A/Udorn/307/72. Two nucleotide substitutions were seen in subunit HA2, at 1074 and 1664, which resulted in replacement of glycine at position 4 by a serine. The two viruses, therefore, represent drift variants occurring in one and the same year isolated in different geographic regions. These genetic differences support the view that antigenic drift in influenza represents an accumulation of point mutations. Figures 1; references 13 (Western).  
[1562-12172]

## CONFERENCES

### 17TH CONGRESS OF ALL-UNION SCIENTIFIC SOCIETY OF MICROBIOLOGISTS, EPIDEMIOLOGISTS AND PARASITOLOGISTS IMENI I. I. MECHNIKOV

Moscow ZHURNAL MIKROBIOLOGII EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 7, Jul 84 pp 3-4

#### UNSIGNED

[Abstract] The Congress was held in Baku 11-13 Oct 1983 and involved the participation of 1244 delegates and guests. Reports were heard on pressing problems of prophylaxis, treatment and elimination of infectious and parasitic diseases in the USSR, improvement of the structure and optimization of administration of the activity of the Sanitary-Epidemiologic Service, methods of teaching epidemiology, and microbiology. Since the previous Congress (6 years ago), much research has been performed. The delegates and guests adopted a resolution emphasizing their support for the peace-loving and constructive policies of the Communist Party of the Soviet Union and the Soviet government  
[1593-6508]

UDC 615.322:582.892]:061.3(100)"1984"

### SECOND INTERNATIONAL SYMPOSIUM ON ELEUTHEROCOCCUS

Moscow FARMATSIYA in Russian Vol 33, No 5, Sep-Oct 84 (manuscript received 16 May 84) pp 89-90

KUDRIN, A.N., professor, Moscow

[Abstract] The Second International Symposium on Eleutherococcus was held in Moscow on April 18-19, 1984, with the Soviet participants joined by scientists from India, Japan, Sweden, FRG, USA and England. The various reports, presentations and discussions encompassed the chemistry, pharmacology and physiological effects of the active principles derived from Eleutherococcus. Of particular interest were studies concerned with the use of the frog and other animals in standardization trials, with theoretical and experimental data provided by A. N. Kudrin and L. G. Rodina (Moscow) on using frogs with CNS ischemia. Prophylactic and therapeutic use of Eleutherococcus in the ischemic frog model and mammalian models of brain ischemia were delineated by

L. V. Leonova (Minsk), and in the case of myocardial ischemia by T. N. Afanas'yeva et al. (Minsk). Eleutherococcal extracts were also reported to exert a positive effect on drosophila by G. D. Berdysheva and S. I. Strel'chuk (Kiev). The latter observations suggested that the drosophila can be utilized for both primary screening and toxicity evaluation, as well as in the elucidation of mechanisms of action. O.N. Voskresenskiy (Poltava), G. V. Kovaleva (Volgograd) and N.K. Fruyentova (Khabarovsk) reported that Eleutherococcus seems to have potential usefulness in enhancing physiological adaptation. This symposium was of special interest in that it helped to clarify some of the molecular and cellular mechanisms of action, and demonstrated the effectiveness of eleutherococcal extracts in mitigating stress.

[1542-12172]

## MISCELLANEOUS

### NEW PESTICIDE ADDITIVE FOR ANTIFOULING COATINGS

Moscow PRAVDA in Russian 18 Oct 84 p 2

[Article by G. Shagiyeva]

[Excerpt] When ships return to port after long cruises, their bottoms, which are covered with a thick mass of seaweed, barnacles and remains of microorganisms, cause repair teams perhaps the most trouble of all. This mass not only worsens a vessel's performance and seagoing qualities but also corrodes its metal plates.

I was shown two metal plates. Both had been immersed in the waters of the Black Sea for two years, but they did not look alike; one had lumpy brownish-green growths all over it, as befitted a ship bottom, while the other was smooth and clean and bore no traces left by the sea. What was the reason for this? The explanation was that they were the result of an experiment: one of the plates had been coated with ordinary paint and the other with a special varnish to which a pesticide had been added. And here was the graphic and convincing result.

The formula for this pesticide additive was developed in the emulsion polymers laboratory of Gor'kiy University's Scientific Research Institute of Chemistry. The Black Sea experiment was the first serious test of theoretical research done by associates of this laboratory. The experiment convinced them that the path they had selected was a promising one. A decision was made to continue work on protection of vessels using pesticides, for the purpose of developing additives not for varnish but for a paint whose use in shipbuilding is planned on a broad scale.

"The protection of materials against biological damage is not a new matter," related Candidate of Chemical Sciences K. Zabotin, head of the laboratory. "A considerable number of other protective agents are known. One of their shortcomings is the fact that they are based on low-molecular weight compounds and their action on microorganisms is of short duration. They are washed out by water, weather away, break down and pollute the environment before they have time to 'do their job' properly. It thus proved necessary to abandon such 'helpers' and turn to polymer compounds. Pesticide materials developed on the basis of these compounds do not dissolve in water or evaporate, their action is longer, and their effectiveness is higher. And they are harmless from the ecological standpoint."

FTD/SNAP

CSO: 1840/064

END